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THE AFRICAN GENUS *TRITONIA* KER-GAWLER (IRIDACEAE): PART 1

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ABSTRACT

Herbarium material and living plants from their natural habitats have been examined for this revision of *Tritonia* Ker-Gawler, an Iridaceous genus found in Africa south of the equator and concentrated in the Republic of South Africa. An anatomical study of the leaves provided useful diagnostic characters, but cytological data were of minor importance.

A new subgeneric delimitation with five sections is established. Three, namely sections *Tritonia* (with four species), *Pectinatae* (four species) and *Teretifoliae* (one species), from the winter rainfall region of the Cape Province except for one species from the Karoo, are treated in the present paper. The two last named sections differ from other sections in their leaf structure. Illustrated descriptions of the species, their geographical distribution and synonymy, as well as a key are provided.

UITTREKSEL

DIE GENUS *TRITONIA* KER-GAWLER (IRIDACEAE) IN AFRIKA: DEEL I

Herbariummateriaal en lewende plante vanuit hul natuurlike habitats is ondersoek vir hierdie hersiening van die genus *Tritonia* Ker-Gawler (familie Iridaceae), 'n genus van Afrika suid van die ewenaar en gekonsentreerd in die Republiek van Suid-Afrika. 'n Anatomiese studie van die blare het bruikbare differensiële kenmerke opgelewer, maar sitologiese gegewens het min bygedra.

'n Nuwe subgeneriese indeling met vyf seksies is ingestel. Drie, nl. seksies *Tritonia* (vier spesies), *Pectinatae* (vier spesies), en *Teretifoliae* (een spesie), uit die winterreënvalstreek van Kaapland behalwe vir een spesie uit die Karoo, word in die huidige artikel behandel. Die twee laasgenoemde seksies verskil van die ander in hul blaarbou. Geïllustreerde beskrywings, die geografiese verspreiding en die sinonimie van die spesies, asook 'n sleutel word aangegee.

INTRODUCTION

Tritonia is an African genus of the Iridaceae, subfamily Ixioideae, and comprises some 30 species. The greatest concentration of species is in the southern coastal districts of the Cape Province of the Republic of South Africa (R.S.A.), the range of the genus extending throughout the Cape Province, Natal and Transvaal, and into the Orange Free State, Lesotho, Swaziland, and the eastern Central African countries up to the equator. (See p. 114).

Species of *Tritonia* became known in Europe and England during the second half of the eighteenth century, and from that time onwards several

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species were described and figured as species of *Ixia* and of *Gladiolus*. In 1802 Ker-Gawler gave the genus its name, observing that "the name is derived from Triton, in the signification of a vane or weathercock, in allusion to the variable direction of the stamens of the different species".

During the nineteenth and twentieth centuries numerous species were described as *Tritonia*. The *Index Kewensis* lists some 105 names, but Baker, who gave the most recent comprehensive rendering of the genus in the *Flora Capensis* (1896) and *Flora of Tropical Africa* (1897), treated 31 species in the former and five species in the latter. Considerably more than half the number of species under *Tritonia* belong to other genera; or their names should go into synonymy.

The present revision is based on the study of fresh material of most of the species in the R.S.A., as well as herbarium material of all the species, from local and overseas herbaria. The question of the relationships of *Tritonia* with *Montbretia* and *Crocosmia* has also been investigated. The genus is now again divided into five sections. Three sections, comprising species from the winter rainfall region of the Cape, are treated in the present article.

MORPHOLOGY

Habit. Tritonias are small to medium-sized herbaceous deciduous geophytes varying in height from ca. 150 to 500 mm or sometimes up to almost a metre.

The underground stem is a tunicated corm which lasts about a year, a new corm being formed annually.

The majority of species are adapted to winter rainfall conditions, the corm remaining dormant throughout the long dry summer months and sprouting after winter rains have started in autumn. They flower in spring and early summer. After the ripening of the seeds in early or later summer, the shoots wither. A small number of species are adapted to summer rainfall conditions and sprout in spring, flowering in summer or autumn.

Reproduction is by cormlets from axillary buds on the corm, as well as by seeds.

Corm. The corm is typical of the tribe *Ixieae*, comprising several internodes, with a narrow central stele surrounded by a wide starch-containing cortex and covered with tunics which are the remains of old leaf bases. The tunics are composed of fine to somewhat coarser fibres which are usually reticulate in the upper half of the corm and almost parallel in the lower half, the soft intercostal parts of the leaf bases having disintegrated.

One or sometimes more shoots develop from the uppermost axillary buds on the corm. During the growing season a new corm for the next season is gradually formed by the swelling of the basal internodes of the shoot.

When more than one shoot develops, a small group of independent corms is then formed.

One or more cormlets may also be produced from lower axillary buds on the corm. In *T. moggii* a stolon, several centimetres in length, may develop with a small cormlet at its end.

The old corm is gradually depleted of its food-materials and withers. Its roots, however, remain functional during the entire growing season, the new corm and cormlets usually producing roots at the beginning of the next growing season.

The corms are almost symmetrical and usually rotund or ovoid or almost cone-shaped with a rounded base. In section *Tritonia* they are squat and depressed; *T. florentiae* has a vertically elongated corm consisting of about seven internodes.

Stem. The above-ground stem (scape) is well-developed, slender, erect or suberect, and with its inflorescence usually overtops the leaves. Rarely (*T. florentiae*) it is short, hardly extending above-ground. It is simple in small plants; in larger plants one, two or three branches are often formed at the base of the inflorescence, each also bearing a number of flowers.

Leaves. A series of four or five cataphylls develops over the growing point on the corm. When this meristem starts growing out to form the shoot, the cataphylls elongate, protecting the young foliage leaves until these reach above-ground.

The cataphylls are distichously arranged, bifacial and colourless. They are closed in their lower half, tightly sheathing the developing shoot. In the fully developed shoot they have withered and cannot usually be distinguished.

Several foliage leaves develop, in a distichous, equitant, often fan-like arrangement. The lower leaves extend from nodes on the corm and others from the base of the scape. In some species the lowermost foliage leaf is shorter than the other leaves, with a shorter unifacial lamina. The upper cauline leaves, few in number, usually subtend side branches of the scape. They are shorter and narrower than the basal leaves and are almost bract-like and largely bifacial.

The leaf sheath is long and bifacial and the lamina is lanceolate, linear-lanceolate or linear, and rarely (*T. kamisbergensis*) wiry and subterete. In most species it is of the ensiform-unifacial type. Interesting variations occur in section *Pectinatae* where the lamina, although unifacial, is not typically ensiform. In *T. cooperi* it has four longitudinal flanges or ridges and is H-shaped in transverse section; in *T. crispa* and *T. lancea*, although apparently ensiform in shape, it is formed by two longitudinal flanges extending from the abaxial surface, which are homologous with two of the four flanges of *T. cooperi* (De Vos, 1982).

Except in the section *Pectinatae* the veins occur in two rows in opposite pairs. Throughout the genus a pair of large (the largest) vascular bundles, each surrounded with a scelerenchymatous sheath, is present in the middle of the lamina, forming a pseudo-midrib. Between them there is a strip of colourless water-storing parenchyma. In a few species from the summer rainfall regions, namely *T. lineata, T. rubrolucens* and *T. strictifolia*, two large veins, joined by a fibre strand, occur near each leaf margin. Although clearly visible in herbarium specimens, they are not so evident in fresh material. This character helps in distinguishing these species.

Tritonia differs from *Ixia* in the almost universal absence of subepidermal sclerenchyma in the leaf margins. In most species of *Tritonia* the margins are strengthened by a thickened epidermis only, the lumen of these cells being almost completely obliterated by the thickened cellulosic cell walls. Only rare exceptions occur, namely *T. marlothii* and *T. delpierrei*, where a small vascular bundle accompanied by a large strand of subepidermal sclerenchyma, occurs in each margin. In some species, e.g. those of section *Pectinatae*, as well as *T. watermeyeri*, the leaf margins have no strengthening tissue at all.

Leaves with crisped and (or) undulate margins occur in *T. crispa* and *T. tugwelliae*, as well as in the incompletely known *T. undulata*. In *T. watermeyeri* the thin-textured leaves are spirally twisted.

In a few species, especially *T. bakeri, T. delpierrei* and *T. kamisbergensis*, the leaves are thickened and contain a colourless water-storing parenchymatous tissue in the centre between the layers of subepidermal chlorenchyma.

Large numbers of tanniniferous cells occur, scattered in the mesophyll and epidermis of most species. In *T. lineata* and *T. rubrolucens* the large amounts of tannin in the leaf epidermis cause the leaves to turn reddish brown or dark brown after drying out.

Inflorescence. The spike, which is dense or lax, is simple, or develops one, two or rarely more branches from its base, each branch subtended by a small bifacial cauline leaf. Four to twelve or more flowers are present on the main axis. The branches have fewer flowers which open later than those on the primary axis.

In the bud stage the flowers are arranged in a characteristic dense, flat, distichous manner. When they open, the spike usually becomes secund or almost secund and in section *Pectinatae* it is somewhat pectinate, because the scape bends below the spike.

Each flower is subtended by two spathe valves (bracts) which become membranous, dry and brownish after the flower has opened. They cover the ovary and base of the perianth tube. The outer bract is usually 3-toothed or varies from acuminate to bidentate (the central tooth being aborted), to 5-toothed, or it may be irregularly lacerated. Several slender veins are present and the upper half is often minutely striped or speckled. The inner bract invariably has two veins and is bidentate or shortly bifid, with two acute or acuminate teeth. The two bracts are equal in length or the outer is sometimes slightly longer than the inner, e.g. in *T. nelsonii.*

Flowers. In the winter rainfall region of the Cape the flowering period is spring to early summer. Exceptions are two species from the eastern extremity of the winter rainfall region in the Eastern Cape Province, namely *T. dubia* which flowers in late winter and *T. laxifolia* which flowers in late summer and autumn. Farther east and north flowering occurs mainly in summer. Flowers last several days and close slightly in the evening.

Perianth. In four sections of the genus the flowers are zygomorphic, the posticous perianth segment being largest and usually erect or suberect and often concave or somewhat hooded, thus protecting the anthers and stigmas which are placed against this segment. The other five segments are spreading or sometimes slightly reflexed. In some species the three anticous segments give the impression of a lower lip, and in the majority of species a honey-guide is present on these segments, in the form of a median yellow or red stripe.

Exceptions are section *Tritonia* and also *T. bakeri* of section *Subcallosae* where the flowers are almost regular (in *T. dubia* completely so) with spreading perianth segments.

In sections *Tritonia* and *Pectinatae* the flowers are often wholly or partially inverted by a twisting of the perianth tube, thus placing the posticous segment in an anterior or lateral position. This was first observed by Ker-Gawler (1803a) who noted that "the reversed position of the organs of fructification . . . is perhaps generally the consequence of the reclined position of the rachis". It also happens, however, when the scape is erect.

The length of the perianth tube compared with that of the segments is of some diagnostic value. In section *Tritonia* the tube is shorter than the segments and shortly funnel-shaped; in sections *Pectinatae* and *Teretifoliae* it is longer than the segments and narrowly tubular in the lower portion, dilating gradually in the upper half or third. In the other two sections species occur with tubes shorter, and others with tubes up to several times longer, than the segments.

In section *Montbretia* a yellow peg-like or thin plate-like protuberance occurs at right angles to the surface, in the median line at the base of the three lower perianth segments. De Candolle (1803) established the genus

Montbretia for species with this character, describing the genus as having "auriculae tres, calloses, sessiles, perpendiculares, in laciniarum trium inferiorum pagina supera solitariae". In the literature they were compared with hatchets (thus the epithet *securigera*) and were described as crests, appendages, calli, a "mamelon allongé" (Redouté, 1804) and "une ecaille elevèe" (Lamarck, 1789). Preference is now given to the term callus.

Calli differ somewhat in shape (Fig. 1), being peg-like in *T. laxifolia* for example, 3–4(–5) mm high and hardly 1 mm wide and slightly curved towards the base of the flower, and in the closely related *T. securigera* usually plate-like and almost equal in height and width, except towards the eastern extremity of the range of this species where they also are peg-like; in *T. florentiae* they are almost triangular and have a slightly undulate upper edge.

Stapf (1924) stated that a small amount of viscid matter was exuded from the tips of the calli in *T. laxifolia*. This could not be verified. The function of the calli is probably to diminish the space in the throat of the perianth, thus ensuring that a visiting insect will brush with its back against the anthers and stigmas.

Vestiges of calli also occur in the majority of species of section *Subcallosae* (therefore the name) and section *Tritonia*. In *T. pallida* (Fig. 1e),

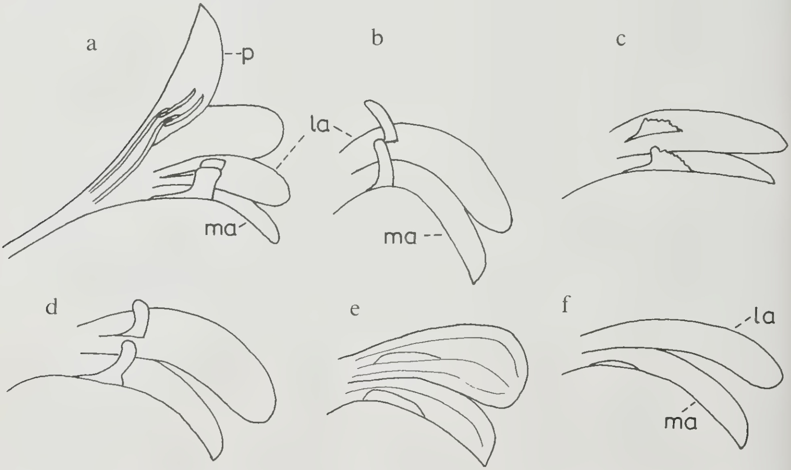

FIG. 1.

Calli on perianth segments of *Tritonia* species: a. *T. securigera,* median section through perianth; b–f, a lateral, and half of the median anticous perianth segment, of: b, *T. laxifolia*; c, *T. florentiae*; d, *T. watermeyeri*; e, *T. karooica*; f, *T. pallida*. la, lateral anticous segment; ma, median anticous segment cut in half; p, median posticous segment cut in half.

T. lineata and *T. rubrolucens* of the former section, as well as in *T. crocata* and *T. deusta* subsp. *miniata* of the latter section, the callosities are in the form of low median ridges, usually less than 1 mm in height, on the claw of the median, or all three, anticous perianth segments. In *T. deusta* subsp. *deusta* a callus occurs on the three outer segments, each as dark as the reddish-black blotch surrounding it. These were noted by several earlier workers, such as Aiton (1789), Willdenow (1797) and Ker-Gawler (1803b). Unfortunately the calli in species of sections *Tritonia* and *Subcallosae* are difficult to recognise in herbarium material.

The presence of calli in sections *Tritonia* and *Subcallosae* has led to the conclusion that the genera *Montbretia* and *Tritonia* are so closely related that they should not be kept separate. In the present revision *Montbretia* is therefore merged with *Tritonia*, as has also been done by Bentham and Hooker (1883), Baker (1896), Diels (1930) and Phillips (1951).

Stamens and pistil. The stamens are inserted in the upper portion of the perianth tube where it widens, and the filaments are shortly decurrent within the tube. In the majority of species the stamens and style are unilaterally curved and inclined towards the posticous perianth segment and often stand against this segment, with the anthers contiguous, facing the anterior side of the flower and dehiscing towards that side. Exceptions occur in section *Tritonia* where the stamens and style are at first slightly inclined towards the posterior side but soon become randomly curved and spreading, with the anthers facing any direction. In *T. dubia* the stamens and style stand erect in the middle of the flower with the anthers extrorse, but later they often tend to curve randomly. *T. bakeri* also has almost erect stamens and style.

The anthers are shortly linear, straight or somewhat falcately curved, and usually 5–8 mm in length. They dehisce by means of longitudinal slits and are versatile, attached to the filaments about one quarter the distance from their bases. In a number of species they are violet or purple or have a violet line down each side.

The pollen is cream, violet or greyish-mauve. The grains are monocolpate, and (70–)80–100(–110) μm in length in the dried condition. The exine is punctitegillate, with sparsely scattered fine granules on the surface (Fig. 2).

Septal nectaries occur in the ovary top. Nectar rises in the perianth tube through capillary action. Pollination is by insects which land on the anterior side of the flower and brush with their backs against the anthers and stigmas above them. In section *Tritonia* they land anywhere.

Except for the position and length of the style, the pistil has little diagnostic value for distinguishing the species. The trilocular ovary with its

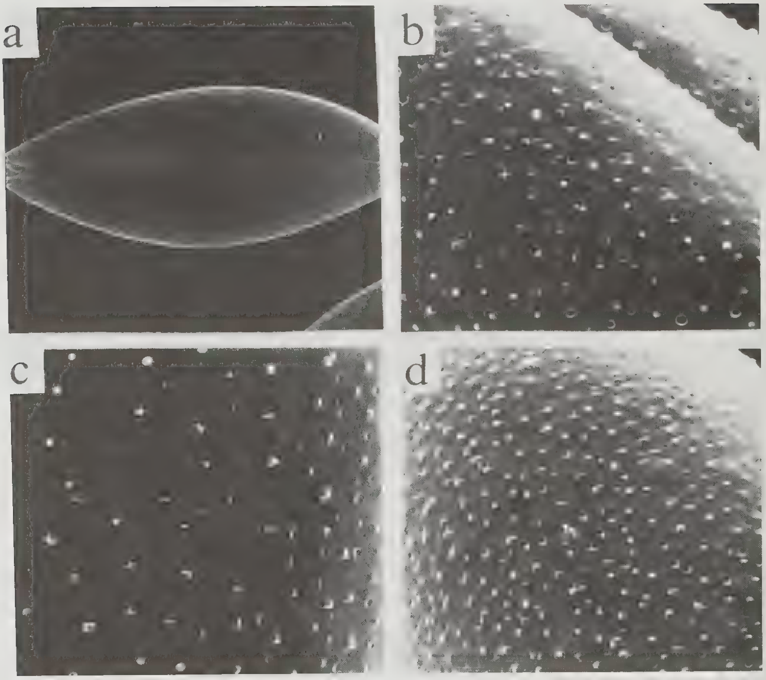

FIG. 2.
Scanning electron micrographs of pollen of *Tritonia* species: a, *T. pallida*, X 660; b, *T. deusta*; c, *T. crispa*; d, *T. lineata*; b–d X 2600.

numerous ovules on axile placentas, is shortly ellipsoid or somewhat truncate and about 2–4 mm in length.

The style is very slender and cream or off-white or sometimes pale pink or yellow especially towards the top when the flowers have those colours. The three style branches are short and slender and at first conduplicately folded. Their upper halves which constitute the three stigmas, usually flatten out to some extent when ripe. The tips are slightly widened and obtuse or sometimes slightly notched, and are minutely papillose on the edges.

Capsule. The capsules are membranous and in the majority of species they are shortly ellipsoid and somewhat trilobed or, when fewer seeds are set, obovoid or almost globose. In *T. dubia* and *T. laxifolia* they are elongated ellipsoid. They dehisce loculicidally starting from the top.

A large number of seeds usually ripen. These are 1,5–2 mm in diameter, are subglobose or angled by pressure, and usually shiny and brown or sometimes black. The testa is minutely reticulate-foveate or almost smooth, or sometimes colligulate *(T. lancea)*. An elevated ridge is present on the raphe, running from the hilum to the micropylar region which is invariably darker brown or black.

CHROMOSOMES

Prior to Goldblatt's major work on the chromosome morphology of the Iridaceae (1971), only one species of *Tritonia* had been investigated cytologically (Brittingham, 1934; Sharma & Sharma, 1960). Goldblatt examined nine species of *Tritonia* and found the basic number to be 11 and all to be diploid except *T. lineata* which is tetraploid.

In the present investigation the chromosomes of ten species of *Tritonia* have been examined, five of which had not been examined before (Table 1).

TABLE 1

Chromosome numbers of species of *Tritonia* now investigated. First counts marked with an asterisk. Voucher specimens in STE.

Species	Diploid number	Collection data
Section Tritonia		
T. crocata	22	Riversdale Show Grounds, *De Vos 2424*
T. squalida	22	East of Riversdale, *De Vos 2423*
T. deusta	22	Riviersonderend–Caledon, *De Vos 2429*
T. dubia	22*	Bronnereservaat, Uitenhage, *Olivier 2553*
Section Subcallosae		
T. pallida	22*	Montagu, *De Vos 2411*
T. bakeri	22*	Hoekoe, Ladismith, *De Vos 2414*
T. flabellifolia	44*	Robertson–Bonnievale, *De Vos 2437*
T. lineata	44	Bronnereservaat, Uitenhage, *Olivier 2603*
Section Montbretia		
T. chrysantha	22*	Buffelsdrif–Bassau, Klein Karoo, *De Vos 2419*
T. watermeyeri	22	Allemorgens, Montagu, *Malan 112*

Goldblatt noted that the karyotype is undistinguished and similar for all the species he examined (except for the tetraploid *T. lineata*); that the chromosomes are fairly small (1,5–2,5 μm) and, although varying rather little in length, three pairs of slightly longer chromosomes could be recognised. The present investigation has shown similar results, except that another tetraploid, namely *T. flabellifolia*, has now been found. As Goldblatt had found this species to be diploid, it can be concluded that this species consists of diploid and tetraploid races. They cannot be distinguished morphologically. The tetraploid condition of *T. lineata* has now been confirmed. Both tetraploids belong to section *Subcallosae*. Sharma and Sharma's count of 60 for *T. crocata* could not be verified.

Species from four of the five sections of *Tritonia* have now been examined for their karyotype.

GEOGRAPHY AND ECOLOGY (Figs 3, 4, 9)

Tritonia species are widespread in southern Africa south of the equator, most occurring in the Republic of South Africa (R.S.A.) from its southernmost tip at S 34° 50′ latitude to Namaqualand, throughout Natal, and Transvaal, and also in Lesotho and Swaziland; only three species occur to the north of the R.S.A., namely *T. nelsonii* in Malawi, *T. moggii* in Mozambique, and *T. laxifolia* in Zambia, Malawi, and Tanzania where it extends almost to the equator. A few species from Abyssinia, Eritrea and Reunion previously placed with *Tritonia*, belong to other genera. *T. mensensis*, for instance, is a *Gladiolus* species. The latest available data indicate that the genus is absent from South West Africa-Namibia, Angola and, apparently, Zimbabwe.

The majority of species are adapted to winter rainfall conditions, 16 species occurring in the Cape winter rainfall region which stretches from the Cape Peninsula eastwards to Port Elizabeth and includes the Little Karoo north of the first mountain ranges; and also stretches from the Cape Peninsula northwards to include Namaqualand where most of the rather intermittent rain also falls in winter.

The greatest concentration of species is in the southern coastal districts of this region, namely Caledon, Bredasdorp, Riversdale and Mossel Bay. Here eleven species have been found, belonging to four of the five sections into which the genus is now divided. West and northwest from this centre of development the number of winter rainfall species diminishes, only two species, namely *T. crispa* and *T. deusta* subsp. *miniata* occurring in the Cape Peninsula and south-western districts below the first mountain ranges. Northwards from this area five species have, however, been recorded: *T. crispa* ranges to Clanwilliam, and the closely related *T. lancea* occurs on Piketberg; farther north two species have been found in the Richtersveld of Namaqualand and another on the Kamiesberg.

Eastwards from the coastal developmental centre the winter rainfall species diminish to five in the Uitenhage–Port Elizabeth area.

A relatively small number of species are spread over the rest of Southern Africa and these are adapted to summer rainfall conditions. They sprout after spring or summer rains have fallen and flower in summer or autumn.

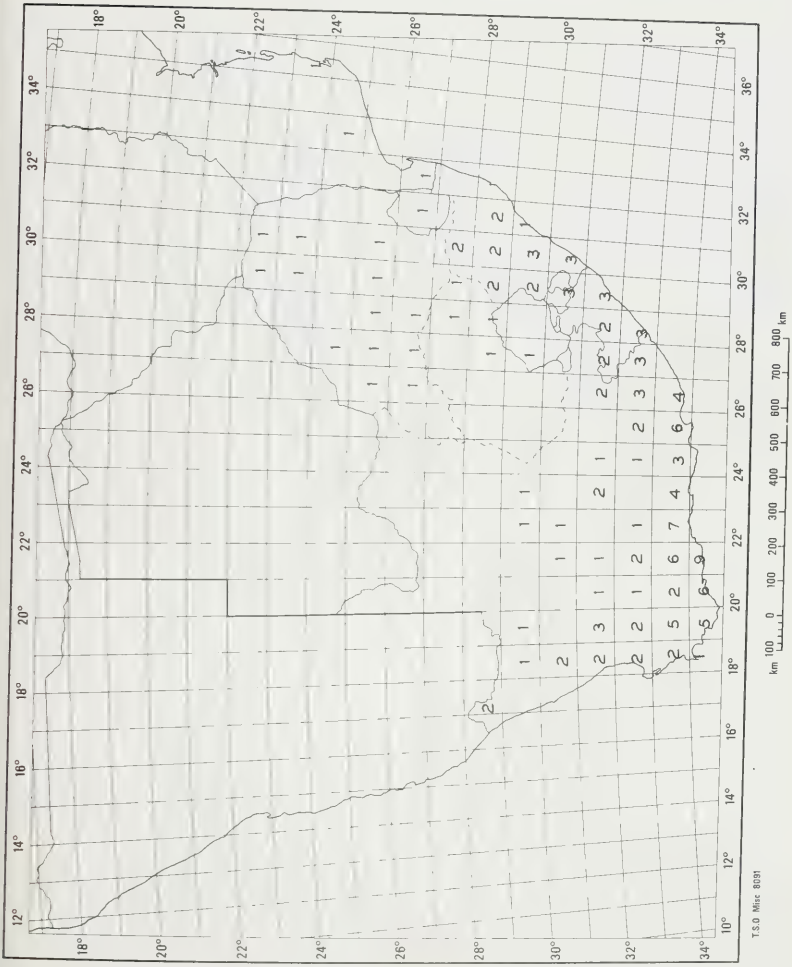

Fig. 3.
Concentration of *Tritonia* species in Southern Africa.

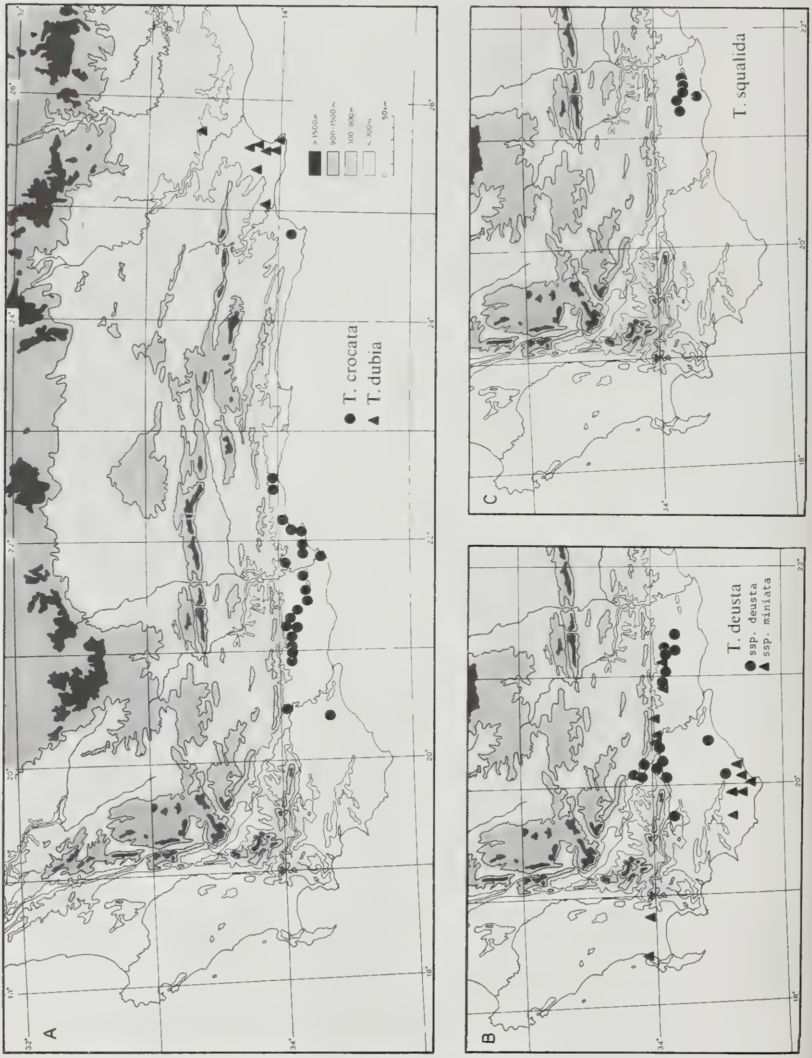

FIG. 4.
Geographical distribution of *Tritonia*, section *Tritonia*: A, *T. crocata* and *T. dubia; B, T. deusta*; C, *T. squalida*.

Three of these species are able to withstand the harsh conditions often prevailing in the Great Karoo where lengthy periods of severe drought of a year or longer occur all too often. These are *T. karooica* which has a wide distribution over the greater part of the western and central Karoo, and *T. tugwelliae* and *T. florentiae* from the southern parts of this region. They sprout after good rains and flower a month or two later.

Eight summer rainfall species have been recorded from the Eastern Cape Province, Natal, Transvaal and also Lesotho. *T. lineata* and *T. rubrolucens* have the widest range, from the Grahamstown area in the Eastern Cape, through Transkei and Natal, to south-eastern Transvaal and the Drakensberg mountain range, the former also extending into the eastern Orange Free State and the western part of Lesotho. *T. nelsonii* is widespread on the Highveld of Transvaal and *T. atrorubens* occurs in a small area in southern Transkei.

Outside the R.S.A. *T. moggii* occurs in the coastal regions of Mozambique and *T. laxifolia* is widespread in Malawi, Zambia and Tanzania. This species poses a problem: herbarium specimens from these regions can in no way be distinguished from *T. laxifolia* found in the Eastern Cape Province around Port Elizabeth and Grahamstown. These two areas are separated by a wide interval of about 1 800 km stretching through the Orange Free State, Transvaal and Zimbabwe where the species apparently does not occur.

Several species, from all five sections of the genus, are local endemics with small restricted ranges: *T. delpierrei* and *T. marlothii* in the Richtersveld and *T. kamisbergensis* on the southern Kamiesberg; *T. lancea* of Piketberg; *T. squalida* in a small area near Riversdale and Albertinia; *T. dubia* near Port Elizabeth and Uitenhage; *T. watermeyeri* near Montagu and Barrydale; and *T. atrorubens* in southern Transkei.

Tritonia species grow on all types of geological strata and in all types of soil, from sandy soil and loam to gravelly, clayey or stony ground which often has very little humus.

The majority of species occur on plateaux or hillsides and flats, and a few, e.g. *T. crocata, T. deusta* and *T. squalida* are even found along roadsides. *T. moggii* is recorded from littoral sand at low altitude. *T. florentiae* has been found on a stony hillside in fissures between upright slate slabs. A few species occur on mountains: *T. kamisbergensis*, confined to the southern Kamiesberg, has corms deep-seated in rocky fissures of old Cape Granite. *T. lineata* grows on the Drakensberg range and also in Natal at low altitude. *T. nelsonii* is widely distributed on the Witwatersrand, the Highveld of Transvaal, and northwards almost to the Limpopo.

Most species grow in open sunshine. The corms are generally quite shallow at about 50–100 mm depth. They are nevertheless able to survive the intense heat generated in the dry summers of the winter rainfall region.

Possibly the extreme dryness of the summer in the south-western Cape is one of the reasons why only two species occur in this area. The southern coastal districts of this region, where the largest number of species is found, often receive some rain in summer.

Whether the three species in the Great Karoo are able to survive lengthy periods of severe drought of a year or longer by means of their corms, is uncertain. Possibly seeds stand a greater chance of survival.

HISTORICAL

Species of *Tritonia* became known in Europe and England during the eighteenth century. Linnaeus (1762) knew of only one species which he named *Ixia crocata*, and D. Delaroche (1766) described two species as *Ixia flabellifolia* and *I. iridifolia*, mentioning also that he had seen a variety of the latter with smaller flowers growing in the botanical garden at Leiden. N. L. Burman (1768) described *I. crocata* again and also *I. undulata*, a species which even today is incompletely known. Thunberg (1783) described in his *Dissertation* on Ixia two species which he had brought from the Cape, namely *I. crocata* and *I. lancea*; and in 1784 he described another two species under *Gladiolus*. In 1774 Masson had brought at least three species of *Tritonia* from the Cape to Kew gardens. These were described by Aiton (1789).

Aiton and Thunberg, as well as other workers of the eighteenth and early nineteenth centuries, such as Jacquin (1789a, b), Willdenow (1797) and Vahl (1805), placed those species of *Tritonia* with almost regular flowers with *Ixia*, and those with more zygomorphic flowers with *Gladiolus*.

The first figure that could be found of a *Tritonia* is in Miller's *Icones* (1758), of *T. crocata*, published with the polynym *Ixia planifolia caule multifloro spatha brevissima*. (The plant named *I. crocata* in Miller's *Dictionary* (1768) is, however, not a *Tritonia*.) Before the end of the century Jacquin (1789a) had figured four species and Andrews (1797) two species. Starting from 1792, a large number of species were figured in *Curtis's Botanical Magazine*; from 1802 under the newly described genus *Tritonia*, established by Ker-Gawler in that year.

Ker-Gawler (1802) stated that the genus differs from *Sparaxis* in the spathe not being partite-lacerated and the leaf axils not bearing bulbils; and from *Gladiolus* in the seeds not being winged. He omitted, then, to indicate in what way it differs from *Ixia*.

The genus *Tritonia* was at first recognised only by the British botanists Aiton (1810) and Harvey (1838), the latter stating that the genus approaches to *Gladiolus* on the one hand and to *Ixia* on the other, from both of which it differs by its scarious bracts. Workers on the continent, such as Vahl (1805), Willdenow (1809) and Roemer and Schultes (1817), kept the species of *Tritonia* under *Ixia* and *Gladiolus*, and it was only after Klatt's major work in 1863 that the genus became generally recognised. Here the genus was subdivided into *Longicolles* with five species (three of which are incorrect for *Tritonia* and belong to other genera) and *Brevicolles* with nine species.

This slow recognition of the genus was perhaps due to Ker–Gawler's initial omission (1802) to state in what way it differs from *Ixia*. In 1805 he noted that the characters of the genus are very difficult to define and only in 1810 did he indicate that it differs from *Ixia* in its "staminibus nec stylum trifariam stipantibus tuboque in faucem dilatato". In 1827 however, he stated that the genus is distinguished from *Ixia* in its stamens inserted below the throat and almost always secund, corolla scarcely regular, segments always obtuse, retuse or subtruncate, and especially in its entirely different habit. Throughout the nineteenth century, starting with Ker–Gawler himself, there was no clear conception of the genus, and numerous species placed under *Tritonia* later were shown to belong to other genera. For example, three of the thirteen species listed under *Tritonia* by Ker–Gawler (1805) belong to genera such as *Ixia* and *Freesia*; and 14 of 32 species enumerated by Baker (1896) later had to be transferred to different genera, e.g. *Gladiolus, Watsonia, Hesperantha*, etc.

Furthermore, some authors considered the name *Tritonia* inadmissible as, according to Rafinesque (1832), there were already two genera to which that name had been applied (this could not be confirmed). Reichenbach (1828) published the name *Waitzia*, with *Tritonia*, "non Cuv. Zool." as only synonym, and Rafinesque, who in America evidently did not know of Reichenbach's new name for the genus, published the name *Belendenia* for it, a name that later was spelled *Bellendenia* (Schlechtendahl, 1833). Ecklon (1827) placed species of *Tritonia* under *Tritonia* and *Freesea*, the latter being a name not validly published.

In 1803 A. P. De Candolle established the genus *Montbretia* for the species *Gladiolus securiger* and *G. flavus* which differ from gladioli in their three "oreillettes calleuses perpendiculaires" on the upper faces of the three lower perianth segments. For more than a century taxonomists have differed about this genus. The majority, e.g. Ker–Gawler (1827), Bentham and Hooker (1883), N. E. Brown (1928), Diels (1930), Phillips (1951), considered it unnecessary and placed it as a section under *Tritonia*; others, namely Stapf (1924) and Sealy (1939–40), retained the genus. Baker and Klatt changed their ideas on the matter, Baker keeping *Montbretia* distinct in 1877 and combining it with *Tritonia* in 1892 and 1895; and Klatt doing likewise in 1882 and 1895. Endlicher (1836–40) on the other hand recognised only *Montbretia*, citing *Tritonia* as a synonym.

Today the name *Montbretia* is often used as a common name by horticulturalists for some species of *Crocosmia* and for *Tritonia-Crocosmia* hybrids (Eliovson, 1973).

The genus *Crocosmia* was described by Planchon (1851–52) for *T. aurea* characterised by saffron coloured flowers with the throat of the perianth not dilated and with trilobed capsules containing only three seeds. Later several more species were added to the genus, chiefly from the eastern parts of South Africa and from Central Africa. At first Baker (1877) did not recognise the genus, but in 1892 and 1896 he restored it to generic level, after Bentham and Hooker had recognised it in 1883. Klatt also gave the genus a varied interpretation, in 1863 and 1895 keeping it as a separate genus, but in 1882 merging it with *Tritonia* as a section. Pax (1888) treated it as a section of *Tritonia* and Phillips (1951) also merged it in *Tritonia*. But Diels (1930), N. E. Brown (1932) and Goldblatt (1976) kept it distinct, although in a private communication Goldblatt expressed doubt whether there was sufficient reason to keep it separate.

Klatt (1882) described the genus *Tritonixia* for species of *Tritonia* characterised by an almost regular perianth with a short tube. Under section *Eutritonixia* he placed twelve species of *Tritonia*, including the type species of the latter genus. He also retained the genus *Tritonia* for species with almost regular flowers and a long perianth tube, including in this several species of *Tritonia* and *Ixia*, as well as a species of *Houttuynia* and of *Crocosmia*. He also kept the genus *Montbretia* for those species with calli on the lower perianth segments, and thus separated species of *Tritonia* into three different genera. In 1895, however, he returned all, except four species, to *Tritonia*. These four species were transferred to *Tritonia* in the following year by Baker, and thus the genus *Tritonixia* went into synonymy.

Work on *Tritonia* in the twentieth century has been fragmentary. L. Bolus (1918, 1926, 1929) described a number of new species of which three are accepted in this revision. N. E. Brown, in an article on the Iridaceae in Thunberg's herbarium (1928), and another (1929) on the Iridaceae of Burman's *Prodromus Florae Capensis*, was able to clear up several important points about these old collections. It is, however, necessary to revise some of his statements. Foster (1936) realised that the names of some species of *Tritonia* were inadmissible being later homonyms, and instigated new names for these species.

Sealy (1939–40) tentatively suggested that, after species of *Montbretia* and *Dichone*, as well as other divergent species, had been removed, the remaining species of *Tritonia* could perhaps be split into three distinct genera. This suggestion was, however, not taken up by any worker and I do not consider it necessary.

In 1959 Lewis showed that a species of Baker's subgenus *Stenobasis*

(1896) is a *Tritoniopsis*, and in 1962 she transferred the three species of subgenus *Dichone* to *Ixia*.

The latest work on *Tritonia* is by Goldblatt (1971, 1974, 1976, the latter in Dyer's *Genera*). In 1971 he examined the chromosome morphology of the Iridaceae, including nine species of *Tritonia*, and concluded that this genus stands close to *Crocosmia* (including *Curtonus*) and *Chasmanthe*, thus bearing out Lewis's view (1954) that these genera are closely related. He placed the above-mentioned genera, as well as the monotypic *Montbretiopsis*, in a distinct subtribe *Tritoniineae*. Later (1974) he merged *Montbretiopsis* in *Tritonia*.

Relationships and Origin

Tritonia is closely related to *Crocosmia* and *Chasmanthe*, differing in its usually ellipsoid membranous or papery capsules with a large number of seeds, and from the latter also in its funnel-shaped perianth tube which widens gradually in the upper portion. It is also related, perhaps less closely, to *Ixia* from which it is sometimes difficult to distinguish. It differs from this genus in its mostly zygomorphic or sometimes almost regular flowers, with the stamens and style curved and often laterally displaced or randomly curved, and leaves generally without a strong strand of sclerenchyma in the leaf margins. One species, *T. dubia*, has regular flowers and connects the two genera.

The above-mentioned genera belong to the subfamily Ixioideae which Pax (1888) subdivided into three tribes, namely *Gladioleae, Ixieae* and *Watsonieae*, with *Tritonia* (including *Crocosmia*), and *Gladiolus*, etc. in the first mentioned tribe and *Ixia* in the second. Hutchinson (1959) likewise placed *Tritonia* and *Crocosmia* in tribe *Gladioleae*, and *Ixia* in tribe *Ixieae* together with *Dierama*, etc. Diels (1930) on the other hand followed Bentham and Hooker (1883) and did not subdivide the tribe *Ixieae* (sensu lato as established by Bentham and Hooker as the equivalent of Pax's subfamily Ixioideae); but Lewis (1954), after a detailed morphological study of the family, was able to subdivide this group with greater success than Pax had done, into six subtribes, the largest of which is the *Ixiineae* comprising amongst others, all the above-mentioned genera. She did not divide this group further into more subtribes as it would have resulted "in an artificial grouping of the genera based entirely on the symmetry of the flowers" (Lewis, 1954).

Goldblatt (1971), with the use of the chromosome morphology as an additional criterion, divided the *Ixiineae* of Lewis into four subtribes, namely *Hesperanthineae, Gladiolineae, Ixiineae* in a narrower sense comprising only the genera *Dierama, Ixia, Sparaxis* and *Synnotia*, and the *Tritoniineae* with *Tritonia, Crocosmia* (including *Curtonus*), *Chasmanthe, Zygotritonia* and *Montbretiopsis*. In my opinion the evidence that places *Tritonia* and its allies apart from the *Ixiineae* in a subtribe of their own, is insufficient. According to Goldblatt *Tritonia* and its allies have a rather different karyotype from that of *Ixia* and its allies; but the idiograms of *Tritonia, Crocosmia* and *Chasmanthe* figured by Goldblatt do not seem to differ much from those of *Ixia, Dierama* and *Sparaxis*, except for the extra chromosome in the haploid complement of *Tritonia* and *Crocosmia* (11 versus 10). (*Chasmanthe* also has ten as in *Ixia*.) This, together with morphological data such as membranous bracts and almost regular flowers in some species of *Tritonia*, suggests that the two subtribes in question should again be united.

Goldblatt's suggestion (1971) is probably correct that *Crocosmia*, which comprises large plants occurring in the eastern parts of southern and central Africa, could have given rise to *Tritonia* and *Chasmanthe*. He further suggested that *Ixia* evolved from *Dierama* in response to the more exacting ecological conditions in the western Cape Province. *Dierama* which has a wide distribution from tropical Africa southwards to the Eastern Cape Province, is a more primitive genus with some unspecialised characters such as its mostly evergreen habit, large persistent corm and regular flowers. *Tritonia* and its allies are probably also derived from a *Dierama*-like ancestor, their specific features having been developed in the course of their migration to southern Africa where different climatic conditions occur.

The monotypic genus *Montbretiopsis* which was merged in *Tritonia* by Goldblatt (1974) differs from the latter in its short, almost subterranean scape and specialised inflorescence with few flowers each on a terminal peduncle. It belongs to section *Montbretia* of *Tritonia* on account of its perianth with large calli. It is the most highly specialised species in the genus.

A fifth genus mentioned with *Tritonia*, namely *Zygotritonia*, is a small tropical African genus described by Mildbraed (1923) to harbour *Tritonia bongensis* and two other species. This genus shows characters which make it difficult to believe that it is related to either *Tritonia* or *Crocosmia*, such as an undivided "hochstens schwach gelappte, aber nicht in deutliche Narbenäste getrennte Griffel" and bilabiate perianth with five clawed tepals forming a sort of lower lip, and few basal ovules (Mildbraed, 1923). The leaf structure is also different (De Vos, 1982).

Subgeneric Grouping of the Species

Baker's subgeneric delimitation of 1892 and 1896 differs widely from that of 1877. With the data at present available neither is acceptable.

In 1877 he kept *Montbretia* separate, widening its circumscription to include species with calli and others with only blotches on the lower perianth segments. He subdivided *Tritonia* into three sections, namely *Eutritonia*, *Dichone* and *Crocosmia*, the first mentioned containing as it should, the type species of the genus. Pax's grouping (1888) was essentially similar, except that he incorporated *Montbretia* with *Tritonia* as a fourth section.

In 1892 and 1896 Baker also placed *Montbretia* with *Tritonia*, returning to it its original De Candollean circumscription. He subdivided *Tritonia* into five subgenera, namely *Tritonixia, Dichone, Tritonia Proper* (*Eutritonia*), *Montbretia* and *Stenobasis*. *Crocosmia* was raised to generic level. For some reason he changed the circumscription of *Tritonia Proper* so that it no longer contained the type species of the genus—this was relegated to subgenus *Tritonixia* which Klatt (1882) had established as genus for species of *Tritonia* with an almost regular perianth. Diels (1930) largely followed Baker's treatment of 1896.

Of the above-mentioned subgenera only two, *Montbretia* and *Tritonixia*, consist of well-defined groups of species. Subgenus *Dichone* was transferred to *Ixia* by Lewis (1962), a decision which was later endorsed by Goldblatt (1971). Subgenus *Stenobasis* is cancelled, as its two species and a hybrid belong to other genera. Subgenus *Tritonia Proper* contains twenty largely unrelated species, ten of which have already been transferred to other genera; and the remaining species are not closely related.

Both Stapf (1924) and Sealy (1939–40) realised the inadequacy of Baker's delimitations and advocated a radical regrouping of the species of *Tritonia*. They proposed that *Montbretia* and *Dichone* should again be given generic rank, and Sealy further proposed that after these groups, as well as those species which belong to diverse other genera, had been removed from *Tritonia*, the remaining 16 species fall into three well-marked groups which could even be accorded generic rank. Only one of his groups, however, that with short-tubed, widely expanded, almost rotate perianth, comprising *T. crocata, T. deusta* and *T. squalida*, is homogeneous. He placed too great an importance on the length of the perianth tube, and each of his other two groups, one with long-tubed perianth and the other with a short-tubed, more or less funnel-shaped perianth, contains heterogeneous elements.

The present subgeneric division in which five sections are recognised, is based on floral and leaf morphology and to some extent on leaf anatomy. Less importance is given to the length of the perianth tube. (Lewis also found (1954) that in several other Iridaceous genera the length of the perianth tube is often of relatively little importance.) The chromosome morphology did not contribute anything, on account of the similarity of the karyotypes of the species investigated.

It has not been found necessary to divide *Tritonia* into separate genera, as Stapf (1924) and Sealy (1939–40) tentatively suggested. *Montbretia* with its large well-developed calli, is again incorporated with *Tritonia* as a section. Several intermediates with small undeveloped calli on one or more of the anticous perianth segments indicate the close relationship of these two taxa. A new section, *Subcallosae*, is therefore established to house the species with zygomorphic flowers, some with small calli and others without any.

Section *Pectinatae* differs from section *Subcallosae* in its scape which is curved below the spike to give the latter an almost pectinate appearance, and in its divergent leaf structure.

Section *Teretifoliae* with a single species *T. kamisbergensis*, is distinguished by its wiry subterete leaves and the absence of calli.

Sealy's group of species with short perianth tube and spreading, almost rotate limb, is section *Tritonia*, as it contains the type species of the genus. *T. dubia* is added to this section.

Tritonia is one of the highly specialised genera of the Ixioideae. Section *Subcallosae* which of the five sections has the second widest distribution in both summer and winter rainfall areas, is considered to be the most primitive of the genus and probably diverged into the other sections, three of which are, with the exception of one species, namely *T. tugwelliae*, confined to the winter rainfall region of the Cape. The almost regular flower of section *Tritonia* is probably specialised, having evolved from a zygomorphic condition.

TAXONOMY

Tritonia Ker-Gawl. in Curtis's Bot. Mag. **11** t. 581 (1802) & sub t. 1275 (1810) & in Kon. & Sims, Ann. Bot. **1**: 227 (1805) partly, & Irid. Gen. 113 (1827), excl. syn. *Houttuynia, Hexaglottis, Sisyrinchium*; Klatt in Linnaea **32**: 755 (1863) & in Abh. Naturf. Ges. Halle **15**: 357 (1882) excl. syn. *Houttuynia*; Benth. in Benth. & Hook. f. Gen. Pl. 3: 708 (1883); Bak. in J. Linn. Soc. **16**: 161 (1877) excl. sect. *Dichone & Crocosma*, & Handb. Irid. 190 (1892) excl. subgen. *Dichone & Stenobasis*, & in Fl. Cap. **6**: 118 (1896) excl. subgen. *Dichone & Stenobasis*; Pax in Nat. Pflanzenfam. **2** (5): 155 (1888), excl. sect. *Dichone & Crocosma*; Stapf in Curtis's Bot. Mag. sub t. 9038 (1925); Diels in Nat. Pflanzenfam. ed. 2, **15a**: 490 (1930) excl. sect. *Dichone & Stenobasis*; N.E.Br. in Trans. Roy. Soc. S. Afr. **20**: 264 (1932) sub *Crocosmia*; Foster in Contr. Gray Herb. **114**: 44 (1936); Sealy in Curtis's Bot. Mag. sub. t. 9592 (1939-40); Lewis in Adams. & Salter, F1. Cape Penins. 249 (1950) excl. *T. scillaris*; Phillips, Gen. S. Afr. Flow. Pl. ed. 2: 218 (1951) excl. syn. *Crocosmia*; Goldbl. in J1 S. Afr. Bot. **37**: 423 (1971) & in Dyer, Gen. S. Afr. Flow. Pl. 972 (1976).

Type species: *T. squalida* (Ait.) Ker-Gawl. (see under *T. squalida*).

Montbretia DC. in Bull. Sci. Soc. Philom. **3**: 151 (1803); Voigt, Hort.

Suburb. Calc. 610 (1845); Klatt in Linnaea **32**: 752 (1863); Bak. in J. Linn. Soc. Bot. **16**: 167 (1877); Stapf in Curtis's Bot. Mag. sub t. 9038 (1924). Type species: *M. securigera* (Ait.) DC.

Waitzia Reichb. Consp. 60 (1828), nom illeg.; non Wendl. (1808 Compositae).

Belendenia Raf. in London Gard. Mag. **8**: 245 (1832). Type species: as for *Tritonia*.

Bellendenia Schlechtd. in Linnaea **8** Lit. Ber. 68 (1833), orth. var. pro *Belendenia*.

Tritonixia Klatt in Abh. Naturf. Ges. Halle **15**: 355 (1882), excl. syn. *Dichone & Agretta*. Type: as for *Tritonia* (lecto-).

Montbretiopsis L. Bol. in S. Afr. Gard. **19**: 215 (1929); Phillips, Gen. S. Afr. Flow. Pl. 219 (1951); Goldbl. in Bothalia **11**: 281 (1974), pro syn. Type species: *M. florentiae* (Marl.) L. Bol.

Freesea Eckl. Top. Verz. 30 (1827), non rite publ.

Plants small to medium, deciduous. *Corm* small, globose to ovoid, sometimes depressed or vertically elongated, with tunics of fine or somewhat coarser reticulate and subparallel fibres. *Scape* well developed, erect, simple or with few branches, sometimes with a collar of old leaf bases around its base, or rarely short and barely extending above-ground. *Leaves* several, basal, distichous, erect to spreading, ensiform-unifacial, falcate or lanceolate-linear, rarely subterete or H-shaped in cross section, glabrous, acuminate to subobtuse, rarely minutely ciliate on the margins; cauline leaves few, small, subulate, somewhat bract-like, largely bifacial. *Spike* simple or with few branches from below its base, secund or sometimes somewhat distichous, with few to numerous flowers, rarely reduced to one. *Bracts* membranous, usually becoming scarious, brown, often sphacelate towards the tip, veined; outer 3-toothed with acute teeth, or sometimes acuminate or 5-toothed or irregularly toothed; inner equal to or slightly smaller than the outer, bidentate or shortly bifid, 2-veined, sometimes with wide papery margins. *Flowers* zygomorphic or almost regular, suberect or spreading, cream, yellow, orange, orangy-red or pink. *Perianth tube* short, funnel-shaped, or long, tubular and widening gradually near the top; *segments* subequal or unequal, the posticous segment often largest, erect and hood-like, other segments then spreading; three anticous segments often bearing an axe-like callus near their bases, often with coloured honey-guides. *Stamens* inserted in the perianth tube where it widens, often asymmetrically arranged; *filaments* often curved towards the posticous segment, or curved randomly; *anthers* linear, often contiguous, placed towards the posticous segment and facing the anticous side, pale or violet. *Ovary* 3-chambered with numerous ovules, shortly ellipsoid; *style* long, slender, often curved, with three short, spreading or recurved stigmatic branches. *Capsules* ellipsoid to obovoid, membranous; *seeds* numerous, small, globose or angled by pressure, with a usually brown, shiny, reticulate-foveate testa. *Chromosome numbers* 2n = 22, rarely 44.

The genus differs from *Crocosmia* in its membranous, many-seeded, usually ellipsoid capsules; from *Chasmanthe* in its gradually widened perianth tube and many-seeded, usually ellipsoid capsules; from *Ixia* in its mostly zygomorphic flowers usually in a secund or almost secund arrangement, with irregularly spreading or unilateral stamens, and leaves without a fibre strand in the leaf margins; from *Sparaxis* in its non-lacerated bracts and usually zygomorphic flowers; and from *Gladiolus* in its scarious bracts and wingless seeds.

KEY TO THE SECTIONS

1. Flowers almost regular (rarely completely regular) with spreading segments; stamens randomly curved (rarely erect), with anthers not contiguous and not all facing the anterior side of the flower:
    2. Leaves lanceolate, ensiform, flat; perianth tube shorter than, or sometimes subequal to the segments .... 1. Sect. **Tritonia**
    2. Leaves linear, somewhat thickened (fresh) and striate (dry); perianth tube longer than the segments .... 4. Sect. **Subcallosae**

1. Flowers zygomorphic, with the posterior segment widest and suberect; stamens curved towards the posterior segment, with anthers contiguous and facing the anterior side of the flower:
    3. Spike dense, curved slightly below its base to give it an almost pectinate appearance; flowers white, cream or pale pink with reddish honey-guides in the throat; leaves with crisped-undulate or inrolled margins or with four longitudinal ribs or flanges .... 2. Sect. **Pectinatae**
    3. Spike lax or sometimes dense, erect or suberect, secund or somewhat distichous, not pectinate; flowers red, orange, yellow, or sometimes pale, often with a yellow honey-guide and sometimes a callus on the lower segments: leaves lanceolate, ensiform, with entire margins, rarely undulate or filiform:
        4. Leaves filiform, terete or subterete, wiry, striate when dry .... 3. Sect. **Teretifoliae**
        4. Leaves lanceolate, ensiform, rarely spirally twisted with undulate margins:
            5. Perianth with a high callus on each, or sometimes only the median, anterior perianth segment .... 5. Sect. **Montbretia**
            5. Perianth without calli, sometimes with a low medianly elongated ridge in the throat on one or all three anterior perianth segments .... 4. Sect. **Subcallosae**

KEY TO SECTION *TRITONIA*

1. Flowers regular; perianth tube slightly shorter than the segments; stamens erect .... 4. **T. dubia**

1. Flowers almost regular; perianth tube about half or less than half the length of the segments; stamens curved irregularly:
  - 2. Claws of the perianth with wide hyaline margins; perianth tube with hardly any yellow colouring in its base:
    - 3. Perianth pale pink to bright mauvish pink, drying to a dirty (squalid) mauve .... 1. **T. squalida**
    - *3.* Perianth bright orange-red or pinkish-orange (vermilion).... 2. **T. crocata**
  - *2.* Claws of the perianth without hyaline margins; perianth tube inside with a small yellow star-shaped base when fresh:
    - 4. Flowers with a reddish-black blotch on the outer perianth segments, rarely also on one or more of the inner segments .... 3. **T. deusta** subsp. **deusta**
    - *4.* Flowers without dark blotches, sometimes with a yellow blotch or rarely a small dark spot on the median anterior segment .... 3. **T. deusta** subsp. **miniata**

KEY TO SECTION *PECTINATAE*

1. Leaf margins undulate and/or crisped:
  - 2. Bracts with dark reddish-brown upper margins; flowers longer than 40 mm, with perianth segments longer than 12 mm .... 5. **T. crispa**
  - *2.* Bracts with pale upper margins; flowers 32–40 mm long, with perianth segments 7–9 mm long ....8. **T. tugwelliae**

1. Leaf margins smooth, entire:
  - 3. Leaves narrow, filiform, channelled, or wider and with four longitudinal ridges or flanges (H-shaped in cross section) .... 7. **T. cooperi**
  - *3.* Leaves linear-lanceolate with inrolled margins, often narrowed between the sheath and lamina into a petiolar middle portion .... 6. **T. lancea**

SECTION *TERETIFOLIAE* has a single species, **T. kamisbergensis.**

Section TRITONIA

Sect. *Eutritonia* Bak. in J. Linn. Soc. **16**: 162 (1877).

Subgen. *Tritonixia* (Klatt) Bak. Handb. Irid. 190 (1892) & in Fl. Cap. **6**: 118 (1896).

Tritonixia Klatt sect. *Eutritonixia* Klatt in Abh. Naturf. Ges. Halle **15**: 356 (1882) partly.

Type species: T. squalida (Ait.) Ker-Gawler

Leaves lanceolate-ensiform, usually spreading fan-wise. *Perianth* almost regular or in one species completely regular, widely cup-shaped, orange to orange-red or pink, often with a small yellow base, variously marked with yellow or reddish-black blotches or lines on the claws, sometimes with a low callus on some blotches; *tube* usually short, with its narrow lower half often slightly curved and twisted, thus inverting the flower partially or wholly; *segments* subequal, obovate-spathulate, clawed, or elliptical, longer than the tube, the inner segments a few millimetres wider than the outer and the posticous segment often about a millimetre wider than any other segment. *Stamens* and *style* at first often curved towards the posticous segment with the anthers facing the opposite side, but later curved randomly, rarely erect.

Distribition: In the winter rainfall region of the Cape Province, mostly in the southern coastal districts from Mossel Bay to Caledon, with outliers to the Cape Peninsula, the Little Karoo and one species in the Port Elizabeth area (Fig. 4).

Three species of this section, collectively known as "Mossel Bay Kalkoentjies", are sympatric and closely related and are distinguished by only minor characters of the perianth such as colouring and markings, and the presence or absence of hyaline zones on the claw margins. They were formerly described as five distinct species, but the two species, *T. crocata* and *T. hyalina*, proved to be conspecific; and two other species, namely *T. deusta* and *T. miniata*, are linked by a continuous series of intermediates and are so closely related that they are now treated as a single species. Many of the older collections in which the flower colouring and markings have faded, or where the bases of the claws are not clearly shown, cannot be identified correctly.

The fourth species here included, namely *T. dubia*, occurs in the Port Elizabeth district in the eastern extremity of the winter rainfall area. It differs in its completely regular perianth.

The inverted position of the flower where the posterior tepal is lateral or on the anterior side, is a constant feature of the three "kalkoentjie" species.

Low calli, hardly 1 mm in height, occur in *T. crocata* and *T. deusta* subsp. *miniata* on the yellow stripe of one, or all three, anticous perianth segments. These calli which are yellow and elongated in the median line of the claw, are difficult to recognise in herbarium specimens. In *T. deusta* subsp. *deusta* a reddish-black callus occurs on the dark blotch of the outer perianth segments.

1. **Tritonia squalida** (Ait.) Ker-Gawler in Curtis's Bot. Mag. **16** t. 581 (1802), excl. syn. *Ixia lancea,* & in Kon. & Sims, Ann. Bot. **1**: 228 (1805); Ait. Hort. Kew ed. 2, **1**: 92 (1810); Bak. in J. Linn. Soc. **16**: 163 (1877), excl. syn. *I. lancea*, & Handb. Irid. 91 (1892), & in Fl. Cap. **6**: 119 (1896); Klatt in Dur. & Schinz, Consp. Fl. Afr. **5**: 207 (1895), Goldbl. in Flow. Pl. Afr. 42 t. 1676 (1956).

Ixia squalida Ait. var. (α) *patula* Ait. Hort. Kew. **1**: 61 (1789); Gmel. Syst. Nat. **2**: 109 (1796); Willd. Sp. Pl. ed. 4, **1**: 206 (1797); non Thunb. (1803). Type: Prom. bon. Spei, *Masson* (BM, holo-).

Tritonixia squalida (Ait.) Klatt in Abh. Naturf. Ges. Halle **15**: 356 (1882).

Ixia similis Salisb. Prodr. 38 (1796), nom. superfl. (excl. syn. *I. hyalina*).
Icones: Curtis's Bot. Mag. t. 581 (1802); Red. Lil. 2 t. 87, sub *Ixia hyalina*; Jacq. Fragm. t. 32 f.2, sub *I. fenestrata var.*; Flow. Pl. Afr. 42 t. 1656; this work **Fig. 5.**

Plants (200–)250–400(–500) mm long. *Corm* ovoid to subglobose, 15–30 mm diam.; tunic fibres fine, reticulate, subparallel at the base. *Scape* (200–) 250–400(–500) mm long, suberect or slightly flexuose, simple or with 1–2 branches, sometimes with old leaf bases 20–30 mm long around the base. *Leaves* 4–8, distichous, lanceolate-ensiform, erect to curved and spreading, (50–)70–200(–300) × 4–10 (–15) mm, acute, sometimes subobtuse, finely striate with a prominent middle vein, sometimes reaching up to the base of the spike; cauline leaf narrower, acuminate, to 80 mm long. *Spike* secund or sometimes somewhat distichous, with (2–)6–10 or rarely more flowers. *Bracts* largely membranous, sometimes greenish towards the base, brown and/or densely speckled in the upper part, and with brown upper margins, (8–)10–16 mm long; *outer* obtuse or 3-toothed, striate with a prominent median vein, sometimes keeled and with the median tooth shorter than the lateral ones; *inner* bidentate, with two veins, equal to or slightly shorter than the outer. *Flowers* almost regular, widely cup-shaped, (30–)35–40(–48) mm long, deep mauvish-pink to pale pink or almost white (RHS 56A-C, 55C, D, 64C, D), often with deeper pink or purplish veins, often deeper pink or yellowish in the base, the anticous segments sometimes with a pale yellow or deep pink median line in the throat. *Perianth tube* (8–)12–15 mm long, curved in its narrow lower half, widening to 7–10 mm diam. in the upper portion; *segments* subequal, spreading, rhomboid-spathulate to obovate-spathulate, obtuse or sometimes minutely emarginate, (16–)20–28 × (8–)10 –17 mm, the claws with wide hyaline marginal zones. *Stamens* irregularly curved; *filaments* 8–12 mm long, often pink in the upper half; *anthers* 5–8 mm, pale or purple, curved, reaching less than halfway up the perianth, with pale yellow or mauve pollen. *Ovary* 2,5–4 mm long; *style* 15–20 mm long, pale; *stigmatic branches* 5–6 mm long, reaching the anther tips or overtopping them. *Capsules* shortly ellipsoid or obovoid-trigonous; seeds brown, smooth, 2 mm diam. *Chromosome number* 2n = 22.

Flowering period: late September to late October.

Distribution: Cape southern coastal districts in a small area from Albertinia to Riversdale and to Stilbaai (Fig. 4C).

CAPE—3421 (Riversdale): Betw. Little Brak River and Riversdale, *Van Eeden* NBG *3026/32*; S of Riversdale on Blombos road (-AA), *Lewis 5632* (NBG), *Goldblatt 5090* (MO); W of Albertinia (-AB), *Barker 8222* (NBG), *Lewis 5567* (NBG), *Goldblatt 4153* (MO); Between Albertinia and Riversdale, *Lewis 3650* (SAM); 8 mls

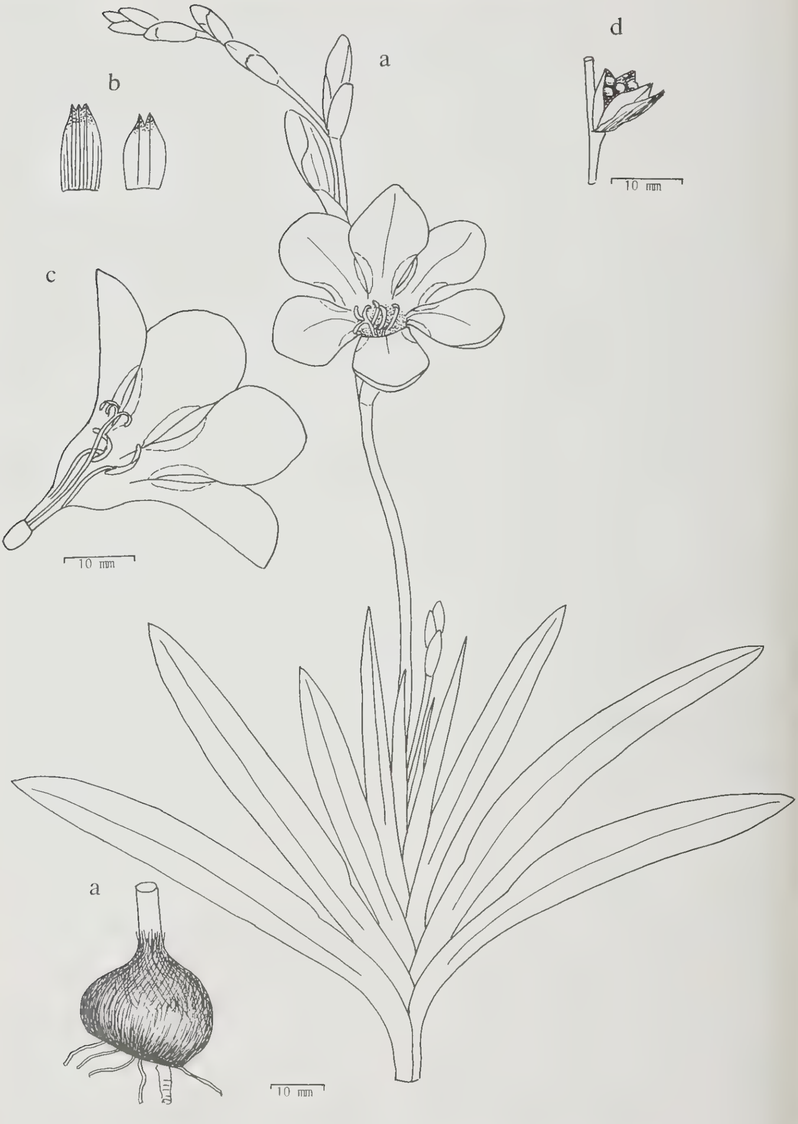

FIG. 5.
Tritonia squalida (*De Vos 2423*): a, plant; b, outer (left) and inner (right) bract; c, flower half in a median section; d, dehiscing capsule.

from Riversdale, *Van Breda 730* (PRE), *De Vos 2423* (STE), *Mauve 4582* (PRE); Near Melkhoutfontein (-AD), *Galpin 4711* (PRE); Albertinia (-BA), *Bayliss 2419* (NBG), *Muir 1090* (BOL), *Admiraal 170* (PRE).

Without precise locality: SAM *21204; Pappe* SAM *48512* (SAM), *1833* (S); *Pappe s.n.* (K); *Thom s.n.* (K); *Ecklon* (S); *MacOwan 345* (K); *Drège Irid. 278* (G); *Verreaux* ann. 1831 (G); sub *T. fenestrata, Ixia fenestrata, I. fenestralis*, etc. (L).

This species is closely related to *T. crocata* which has a perianth with similar hyaline marginal zones on the claws. It differs from the latter mainly in its flower colouring and according to Ker-Gawler (1802) in being scented—the latter feature could not now be verified. In dried specimens the flower colour fades to a rather dirty mauve, hence the name. Fresh specimens are certainly not squalid.

Jacquin (1809) considered *T. squalida* and *T. crocata* to be conspecific, describing and figuring the latter as *Ixia fenestrata* (1790) and the former as a variety of this (1809). The type of *I. similis* Salisb. could not be found, but it appears that Salisbury (1796) also included both species under this name. He gave no indication of the flower colouring and cited both species as synonyms.

On the other hand Aiton (1789) described them as separate species and Ker-Gawler (1802), Baker (1896) and Klatt (1882) followed him in this. In the present work they are also treated as distinct species, as even old herbarium specimens are readily distinguishable and as no specimens have as yet been found in natural populations which can be distinguished as intermediates. In South African gardens, however, Tritonias occur with a bright vermilion pink colour which might perhaps have originated as garden hybrids between these two species. Plants with a similar colouration have not been found in nature.

Natural putative hybrids between *T. squalida* and *T. deusta* have been collected near Albertinia (*Bayliss 2420* in NBG).

According to the *Index Nominum Genericum* (1979) the name *T. squalida* is illegitimate, the reason probably being that Ker-Gawler cited *Ixia lancea* Thunberg as a synonym when he made the combination in 1802. He was, however, uncertain about this, as he placed no less than five question marks, one after each of the literature references he cited with *I. lancea*. He also observed that "we have not adopted Thunberg's trivial name of *lancea*, for although, taking circumstances together, we have little doubt but this is his plant, yet the description is far too vague to apply with certainty to any species". (If he had seen Thunberg's type he would without any doubt have realized that *I. lancea* is a totally different species—cf Fig. 12). But as he was uncertain about the matter, it can be concluded that Article 63 of the *International Code of Botanical Nomenclature* does not apply in this case and that the name *T. squalida* can be regarded as legitimate. (Ker-Gawler also correctly cited as synonyms a variety of *Ixia crocata* of Burman, Prodr., as well as *I. similis* Salisbury, a later synonym.)

2. **Tritonia crocata** (L.) Ker-Gawler in Curtis's Bot. Mag. sub t. 581 (1802) & in Kon. & Sims, Ann. Bot. **1**: 228 (1805); Klatt in Linnaea **32**: 763 (1863) & in Dur. & Schinz, Consp. Fl. Afr. **5**: 204 (1895); Bak. in J. Linn. Soc. **16**: 162 (1877) & Handb. Irid. 190 (1892) pro parte, & in Fl. Cap. **6**: 119 (1896) excl. var. *miniata*; non sensu Goldblatt in Flow. Pl. Afr. sub t. 1655 (1972).

Ixia crocata L. Sp. Pl. ed 2, **1**: 52 (1762), excl. cit. Miller; & Syst. Nat. ed 12, p. 75 (1767); Burman f. Fl. Cap. Prodr. **1** (1768); Thunb. Diss. Ixia 17 (1783) excl. var. a; Aiton, Hort. Kew. **1**: 60 (1789); Curtis, Bot. Mag. t. 184 (1791); non Miller, Gard. Dict. ed. 8 (1768). Type: Cape, s. coll. (LINN, holo-).

Gladiolus crocatus (L.) Pers. Syn. Pl. **1**: 44 (1805).

Tritonixia crocata (L.) Klatt in Abh. Naturf. Ges. Halle **15**: 355 (1882).

Ixia iridifolia Delaroche, Descr. Pl. Aliq. Nov. 24 (1766); Goldblatt & Barnard, in Jl S. Afr. Bot. **36**: 310 (1970). Type: sub *I. crocata* (Hb. Van-Royen, L. neo-).

I. hyalina L.f. Suppl. 91 (1781); non DC. in Red. Lil. t. 87 (1805). Type not found. The description may be regarded as type (Art. 9.3).

Tritonia hyalina (L.f.) Bak. in J. Linn. Soc. **16**: 163 (1877) & Handb. Irid. 191 (1892) & in Fl. Cap. **6**: 119 (1896); Klatt in Dur. & Schinz, Consp. Fl. Afr. **5**: 205 (1895).

Tritonixia hyalina (L.f.) Klatt in Abh. Naturf. Ges. Halle **15**: 356 (1882).

Ixia fenestrata Jacq. Coll. **3**: 270 (1789) & Ic. t. 289 (1790), lecto-type; non Thunb. (1803, 1811), nec. Jacq. (1809).

Belemcanda fenestrata Moench, Meth. 529 (1794).

Tritonia fenestrata (Jacq.) Ker-Gawl. in Curtis's Bot. Mag. 19 t. 704 (1804) & in Kon. & Sims, Ann. Bot. **1**: 228 (1805); Klatt in Linnaea **32**: 762 (1863).

Ixia similis Salisb. Prodr. 38 (1796) nom. superfl. (excl. syn. *I. squalida* var.).

I. planifolia caule multifloro Miller, Ic. 160 & t. 239 f.2 (1758).

Tritonia sanguinea Eckl. Top. Verz. 29 (1827). Type: *Ecklon*, E.H.B. Oct. 14–26 (S, holo-).

Icones: Miller, Ic. t. 239 f. 2; Jacq. Ic. rar. t. 289 sub *Ixia fenestrata*; Curtis's Bot. Mag. t. 184 & t. 704; Nature Notes **7** (1923); this work **Fig. 6.**

This species is very closely related to *T. squalida*, resembling the latter in its corm, leaves, spike, bracts, stamens and pistil, and also in the hyaline marginal zones on the claws of the perianth. It differs from *T. squalida* in

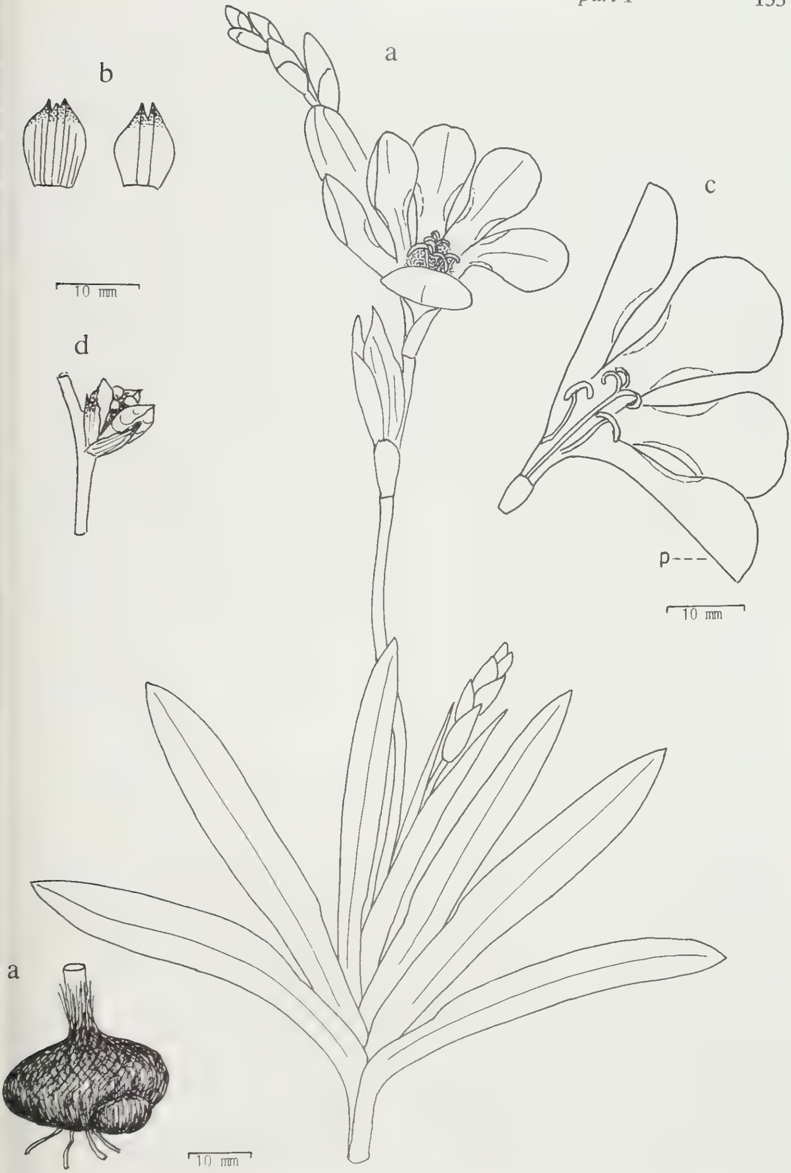

FIG. 6.
Tritonia crocata (*De Vos 2424*): a, plant; b, outer (left) and inner (right) bract; c, inverted flower half in a median section; d, dehiscing capsule; p, posticous perianth segment.

the following characters: *Flowers* bright fiery orange or orange-red (RHS 28A, 33B), sometimes pinkish-orange, *Perianth segments* obovate-spathulate, without prominent veins, the three anticous segments in the throat furnished with a narrow yellow median stripe variable in length and sometimes raised to form a low (less than 1 mm high) callus.

Flowering period: September to November.

Distribution: Cape south coastal districts from Swellendam to George and rarely to Humansdorp and Tulbagh (Fig. 4A).

CAPE—3319 (Worcester): Prope Tulbagh (-AC), *Ecklon 811* (MO).
—3322 (Oudtshoorn): Georgetown (-CD), *Prior s.n.* (K); Touws River, Wilderness (-DC), *Taylor 4118* (PRE, STE).
—3420 (Bredasdorp): In campis ad Swellendam (-AB), *Zeyher PRE 36543, MacOwan s.n.* (K); 15 mls from Skipskop to Swellendam (-AD), *Admiraal 165* (PRE); Heidelberg (-BB), *Swart STE 11683*; 2,6 mls from Heidelberg to Riversdale, *Mauve 4579* (STE).
—3421 (Riversdale): West of Riversdale (-AA), *Thompson 3281* (PRE, STE), *Barker 8215* (NBG); Between Heidelberg and Riversdale, *Middlemost 2185* (NBG); East of Heidelberg, *Goldblatt 4957* (MO); 8 km from Riversdale to Albertinia (-AB), *Mauve 4582* (PRE); Riversdale, *Van der Spuy s.n.* (STE), *Walters 137* (NBG), *Jordaan 784* (STE), *Bayliss 2421* (NBG, not in G); 4 mls on the Riversdale–Garcias road, *Goldblatt 454* (BOL); Albertinia (-BA), *Muir 876* (BOL, PRE, MO), *Middlemost 1831* (NBG); Along Albertinia–Mossel Bay road (-BA-B), *Van Breda 1228* (PRE); Herbertsdale (-BB), *Heese s.n.* (STE); Between Gouritz River and Mossel Bay, (-BA), *Lewis 3654* (SAM), PRE *36541*; 15 mls E of Albertinia (-BB), *Acocks 21551* (PRE); Gouritz River Mouth (-BD), *Horrocks 38* (NBG).
—3422 (Mossel Bay): Mossel Bay distr., *Hops 27* (BOL); Braakfontein, Mossel Bay, *Middlemost 1825* (SAM, NBG); Voorbaai (-AA), *Black s.n.* (BOL); Municipal rubbish heap, Mossel Bay, *Strauss 37* (NBG); Between Klein Brak and Hartenbosch, *Burchell 6199* (K).
—3424 (Humansdorp): Humansdorp (-BB), *Middlemost 1812* (BOL, NGB).
Without precise locality: *Ecklon & Zeyher Irid 279* (B, MO); *Metelerkamp* NBG *1735/26; Thom 973* (K); *Ecklon 811* (S); *Ecklon* sub *T. sanguinea* (S); *Thunberg* ann. 1773 (S); Thunberg Hb. *944* (UPS); *Meijer* sub *T. fenestrata* (C); Burman Hb. sub *Ixia crocata, I. planifolia, I. crocea* (G).

Linnaeus described *Ixia crocata* in the second edition of the *Species Plantarum* (1762), citing Miller's figure 156 f. 1. He corrected this error in *Systema Vegetabilium* (1767). As Linnaeus's description is clearly based on the plant in his herbarium (the holotype) and not on Miller's figure, *T. crocata* is taken to date from 1762 (see also Goldblatt, 1972 sub t. 1655). Probably misled by the error in the *Species Plantarum*, Delaroche described a similar plant as *I. iridifolia* (1766), believing it to be a new species. His name is a later synonym of *I. crocata.*

The two species *T. crocata* and *T. hyalina* are conspecific. The early descriptions of *T. crocata* (as *I. crocata*) by Linnaeus (1762), Curtis (1791), Thunberg (1783) and Aiton (1789) state that the lobes of the "petals" or "corolla" are hyaline at their bases. The only hyaline zones that have ever been found in *Tritonia* are marginal on the claws, as described for *T. hyalina*. This feature is also shown in Miller's figure t. 239 f. 2 which Linnaeus cites with *I. crocata* (1767) and in *Bot. Mag.* t. 184 of *I. crocata*, as well as in t. 704. The last mentioned, named *T. fenestrata*, is a *T. crocata* with narrower perianth segments.

Baker (1896), in trying to maintain the two species, *T. crocata* and *T. hyalina*, changed the description of *T. crocata* by omitting to mention the hyaline zones on the perianth. According to him *T. hyalina* differs from *T. crocata* in the perianth segments being spathulately narrowed into a claw with an inflexed hyaline margin. As stated above, however, the old descriptions of *T. crocata* did mention hyaline zones at the bases of the perianth segments.

Specimens without hyaline claw margins, figured as *T. crocata* in *Nature Notes* no. **6**:5 (1923) and in *Flowering Plants of Africa* **42** pl. 1655 (1972) are therefore not this species, but are *T. miniata* (now treated as a subspecies of *T. deusta*).

T. crocata is also closely related to *T. deusta* subsp. *miniata*, differing from this in its characteristic hyaline zones on the claw margins, also in having very little or no yellow colouring within the base of the perianth tube; the flower colouring is slightly more towards a fiery red. Fresh material can readily be distinguished but in herbarium specimens the yellow colouring usually fades, and if the claws are not well preserved, there is no way of identifying the two taxa. The distribution of *T. crocata* is slightly more towards the east than that of *T. deusta*, but in the Riversdale–Albertinia region the ranges overlap. Here intermediates have been found.

3. **Tritonia deusta** (Ait.) Ker-Gawler in Curtis's Bot. Mag. **17** t. 622 (1803).

The species is closely related to *T. squalida*, resembling the latter in its corm, leaves, spike, bracts, stamens and pistil. It differs from *T. squalida* in the following features: *Flowers* bright reddish-orange or orange-salmon (RHS 28A, B). *Perianth tube* inside with a yellow, often red-margined star-shaped base, with six or twelve short yellow radiating lines (fresh material); *segments* without hyaline margins on the claws, the outer segments with a dark reddish-black blotch or median stripe in the throat and a low ridge or callus in the centre of each blotch, or the anticous segments with a small yellow, sometimes red-margined blotch or small dark blotch.

Flowering period: September to October.

Distribution: Cape southern districts from Caledon to Riversdale, Robertson and Montagu, and very rarely in the Cape Peninsula and the Stellenbosch district (Fig. 4B).

The two species, *T. deusta* and *T. miniata*, are here combined under

T. deusta as they are connected by a continuous series of intermediates. De Candolle, in Redouté's *Liliacées* (1804) also regarded these two taxa as conspecific, naming the species *Ixia miniata* var. *A* and var. *B*, the latter with the epithet *nigro-maculata*.

The species, sensu lato, has its flower colouring almost as in *T. crocata*, but slightly more towards the orange side. It differs in the absence of hyaline marginal zones on the claws of the perianth, and in the presence of a distinct, yellow, often red-margined star-shaped base within the perianth tube, with six or twelve short radiating lines; also in the presence of a reddish-black or a yellow blotch on some perianth segments. The yellow base and yellow blotches unfortunately fade in dried material.

Variation occurs in the number, size and shape of the dark blotches on the perianth. Specimens with a reddish-black blotch (which does not fade in dried material) or a dark median stripe on the three outer segments belong to subspecies *deusta*; those without these blotches are subspecies *miniata*. Intermediates show a single small dark spot or line on the median, or all three anticous segments. Such have been found along the road-sides between Riviersonderend and Caledon, amongst populations of the typical subspecies, as well as in the Bredasdorp district between Arniston and Elim amongst populations of subspecies *miniata* (*De Vos 2432, 2433* in STE). Some old collections, e.g. *Ecklon & Zeyher 103* in S, from Riviersonderend, Swellendam, also have such intermediate forms, and *Zeyher 3974* in K and other herbaria consists of both subspecies.

Similar variation was recognised by several earlier workers. Andrews (1797) for example, was able to recognise "19 distinct varieties" of *Ixia deusta* in the close investigation he had given them over a number of years. He found them "to sport in colour &c. from the same root but much more so from seed". Most of these varieties probably originated as garden hybrids. In South African gardens the "kalkoentjies" which are popular garden plants, also hybridise readily.

Hybridisation undoubtedly also occurs in the veld, for example between the two subspecies of *T. deusta* already mentioned, as well as between *T. deusta* subsp. *miniata* and *T. crocata*.

a. subspecies **deusta**

Tritonia deusta (Ait.) Ker-Gawler in Curtis's Bot. Mag. **17** t. 622 (1803) & in Kon. & Sims, Ann. Bot. **1**: 227 (1805); Klatt in Linnaea **32**: 762 (1863) & in Dur. & Schinz, Consp. Fl. Afr. **5**: 204 (1895); Bak. in J. Linn. Soc. **16**: 162 (1877) & Handb. Irid. 190 (1892) & in Fl. Cap. **6**: 119 (1896).

Ixia deusta Ait. Hort. Kew. **1**: 60 (1789); Willd., Sp. Pl. **1**: 205 (1797). Type: Cape, *Masson* (BM, holo-).

Tritonixia deusta (Ait.) Klatt in Abh. Naturf. Ges. Halle **15**: 356 (1882).

Ixia crocata var. *a* Thunb. Diss. Ixia 17 (1783).

I. crocata var. *nigro-maculata* Andr., Bot. Rep. 2 t. 134 (1797).

I. gibba Salisb. Prodr. 38 (1796) nom. superfl. Type: as for *T. deusta*.

I. miniata var. *B, nigro-maculata* DC. in Red. Lil. t. 89 (1804); non Jacq.

Tritonia coccinea Eckl. Top. Verz. 29 (1827) e descr., no type found; non L. Bol.

Icones: Andrews, Bot. Rep. 2 t. 134; Curtis's Bot. Mag. t. 622; Red. Lil. t. 89; this work **Fig. 7.**

Perianth with a reddish-black blotch or stripe on the outer segments, usually with a medianly elongated raised ridge or callus in the centre of each blotch; blotches sometimes also on one or more inner segments.

CAPE—3318 (Cape Town): Inter Stellenbosch & Helderberg (-DD), *MacOwan 953* (G partly, not BOL, SAM).

—3319 (Worcester): Boschjesmansrivier, Robertson (-DD), *Lewis* BOL *21734* (BOL, PRE).

—3320 (Montagu): Near Bonnievale (-CC), *Marloth 11817* (STE, PRE), *Gillett 1154* (BOL, STE); Near Ashton, *Van Breda 1509* (PRE); Swellendam–Ashton road (CC/D), *Rousseau 20* (STE).

—3419 (Caledon): 20 km E of turn-off to Krige (-BA), *De Vos 2429* (STE).

—3420 (Bredasdorp): 5–9 km E of Stormslvei (-AA), *De Vos 2428* (STE); Between McGregor and Stormsvlei, *Lewis 6101* (NBG); 10 mls from Riviersonderend to Swellendam, *Mauve 4581* (PRE, STE partly); Bushmans River, Swellendam (-AB), *Barker 1326* (BOL, NBG); Between Swellendam and Stormsvlei (-AA/B), *Goldblatt 2925* (MO); Kathoek (-AD), *Acocks 22750* (PRE); Heidelberg (-BB), *Muir* SAM *11420*, *Swart* STE *11143*, *Stayner s.n.* 20–10–62 (NBG); Zwellendam am Ufer des Rivierzonderend bei Appelskraal, *Zeyher* 90.9 (G); Zwellendam auf Hügeln by Puspasvalei, *Ecklon & Zeyher Irid 103* (G, MO); Bredasdorp (-CA), *Uys* STE *25442*.

—3421 (Riversdale): 10 mls W of Riversdale (-AA), *Richmond 6* (NBG); Riversdale streets, *Muir* PRE *36559*; Around Riversdale, *Muir 2968* (BOL), *Loubser 2046* (NBG); 5 mls S of Riversdale on Blombos road, *Lewis 5637* (NBG); Between Riversdale and Albertinia (-AB/BA), *Pillans 1229* (BOL).

Without precise locality: *Ecklon & Zeyher 106* (SAM), *Irid 103* (S); *Ecklon* (S, C); Breede River *Thom* (K); Coll. *Burman* sub *Ixia crocata & I. iridifolia* (G); sub *I. maculata & I. iridifolia* (L); sub *I. crocata* var. (Bergius scripsit) (S).

This subspecies is readily distinguished by the dark blotch on the outer perianth segments which remains visible even in old herbarium material. Specimens with a single small dark spot or line on the anticous segment are regarded as intermediates between the two subspecies, e.g. *De Vos 2434*.

Invariably a thickened ridge-like callus occurs in the centre of each dark blotch or stripe, as dark as the blotch itself. Willdenow (1797), Ker-Gawler (1803) and De Candolle in Redouté's *Liliacées* (1804) also noted these ridge-like excrescences.

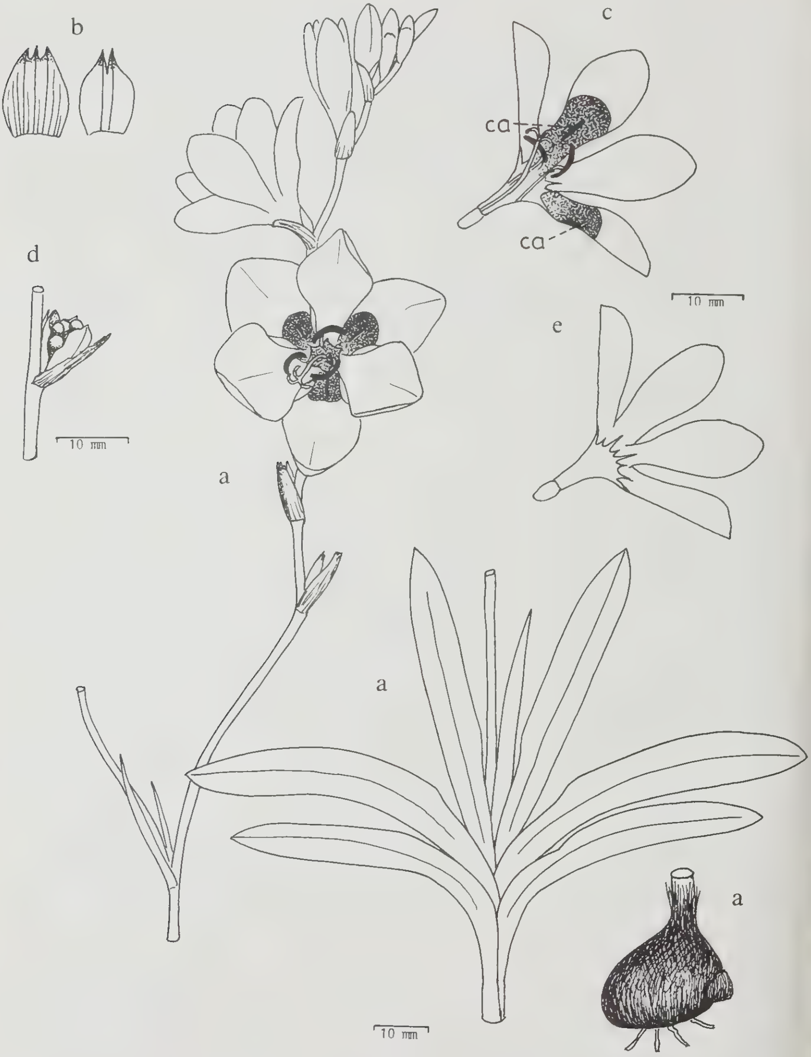

Fig. 7.
Tritonia deusta (*De Vos 2428*): a–d, subsp. *deusta*: a, plant; b, outer (left) and inner (right) bract; c, flower half in a median cut; d, dehiscing capsule; e, subsp. *miniata* (*De Vos 2435*), perianth half; ca, callus.

b. subspecies **miniata** (Jacq.) De Vos, comb. nov.

Ixia miniata Jacq. Hort. Schoenbr. 10 & t. 24 (1797) & Fragm. 28 & t. 32 f. 1 (1809). Type: Hort. Schoenbr. t. 24, icono, lecto.-*I. miniata* var. *A*, DC. in Red. Lil. sub t. 89 (1804).

Tritonia miniata (Jacq.) Ker-Gawl. in Curtis's Bot. Mag. **17** t. 609 (1803) & in Kon. & Sims, Ann. Bot. **1**: 228 (1805); *Eckl.* Top. Verz. 30 (1827); Klatt in Linnaea **32**: 761 (1863) & in Dur. & Schinz, Consp. Fl. Afr. **5**: 206 (1895); Bak. in J. Linn. Soc. **16**: 162 (1877).

Tritonixia miniata (Jacq.) Klatt in Abh. Naturf. Ges. Halle **15**: 356 (1882).

Ixia crocata var. β sensu F. Delar. in Red. Lil. **6**: 335 (1811).

Tritonia crocata sensu Bak. Handb. Irid. 190 (1892) & in Fl. Cap. **6**: 119 (1896), as to descr., excl. syn.; sensu Goldbl. in Flow. Pl. Afr. **42** pl. 1655 (1972).

T. crocata var. *miniata* (Jacq.) Bak. in Handb. Irid. 190 (1892) & in Fl. Cap. **6**: 119 (1896): Lewis in Adams. & Salter, Fl. Cape Penins. 841 (1950).

T. aurantiaca Eckl. Top. Verz. 29 (1827) e descr., no type found.

Icones: Jacq. Hort. Schoenbr. t. 24 & Fragm. t. 32 f. 1; Curtis's Bot. Mag. t. 609; Red. Lil. 6 t. 335; Nature Notes no. **6** opp. p. 4 sub *T. crocata*; Flow. Pl. Afr. **42** pl. 1655.

Perianth without a dark blotch or stripe on the outer segments; anticous segments sometimes with a yellow, often red-margined blotch or small dark spot or median line.

CAPE—3318 (Cape Town): Rondebosch (-CD), *Drège s.n.* (K); Lion's Head, Signal Hill, *Marloth 5645* (PRE); Lower slopes of Lion's Head off Kloofnek Road, *Foley* BOL *24932* (BOL, PRE), SAM *60145*; Lion's Head slopes, *Ecklon & Zeyher* SAM *21202*; Inter Stellenbosch and Helderberg, *MacOwan 953* (BOL, SAM, and G partly).
—3412 (Caledon): 3 km W of Elim (-DA), *De Vos 2434* (STE); Farm Heuningrus between The Poort and Elim (-DB), *Van der Merwe* NBG *62916*; Between Napier and Bredasdorp (-DB), *De Vos 2432* (STE).
—3420 (Bredasdorp): Regione Zwellendam, (-AB), *Ecklon 812* (PRE); In campis ad Swellendam, *Pappe* SAM *21202*; Below 10 o'clock Mt., *Wurts 476* (NBG); Zwellendam auf Hügeln bei Puspasvalei, *Drège Irid. 104* (G); Suurbraak (-BA), *Wiese* NBG *569/34*; Heidelberg (-BB), *Loubser 2047* (NBG); Arniston (-CA), *Van Breda 1478* (PRE); Near Waenhuiskrans, *De Vos 2433* (STE); Die Mond (-CC), *Thompson 3235* (PRE); Struisbaai, *Leipoldt 3603* (BOL).
—3421 (Riversdale): 13 mls W of Riversdale (-AA), *Lewis 5569* (NBG); Near Riversdale (-AB), *Van Breda & Admiraal* PRE *30284;* Aasvoëlberg, Albertinia (-BA), *Bohnen 7722* (STE).
Without precise locality: *Ecklon* (C); *Zeyher 3974* (G); sub *T. miniata* (L).

Variation occurs in the markings on the perianth. In 1797 Jacquin described and figured *I. miniata* as having flowers with a yellow base and twelve yellow lines radiating from this: six longer lines opposite the middle of each segment and six shorter lines below the sinuses between the segments. Twelve years later (1809) he broadened the circumscription of the species to include specimens with a yellow blotch in the throat on the three anticous segments. Ker-Gawler's plant in the *Botanical Magazine* t. 609 also shows a yellow blotch on the three anticous segments, whereas Redouté's figure 335 shows four yellow blotches.

Plants with a perianth similar to Jacquin's iconotype (1797) occur in the Bredasdorp district a few kilometres from the coast. They are dwarf, starved plants with considerable variation in the length and number (6 or 12) of the yellow lines radiating from the base and in the presence of a red margin to the yellow base; also in the presence (or absence) of a short dark-red median line or spot on one, or all three, anticous segments. Those with dark spots are regarded as intermediate between the two subspecies.

Variation apparently also occurs in collections found on Signal Hill near Cape Town: Marloth's no. *5645b* in PRE has a note, "The posterior segment (i.e. the originally anticous) with a dark spot at its base"; whereas other collections, e.g. *Foley* (BOL *24932*), show no dark spots.

4. **Tritonia dubia** Eckl. ex Klatt in Linnaea **32**: 761 (1863) & in Dur. & Schinz, Consp. Fl. Afr. **5**: 205 (1895); Bak. Handb. Irid. 194 (1892) & in Fl. Cap. **6**: 124 (1896). Type: Cape, Uitenhage, *Ecklon & Zeyher Irid. 102* (B, holo-, not extant; SAM spec. no. 1, lecto-; S partly, G iso-).

T. dubia Eckl. Top. Verz. 30 (1827) nom. nud.; Nordenstam, in Jl S. Afr. Bot. **38**: 292 (1972).

Montbretia dubia (Eckl. ex Klatt) Bak. in J. Linn. Soc. **16**: 169 (1877).

Tritonixia dubia (Eckl. ex Klatt) Klatt in Abh. Naturf. Ges Halle **15**: 356 (1882).

Tritonia bolusii Bak. in J. Bot. Lond. **14**: 337 (1876); Klatt in Dur. & Schinz, Consp. Fl. Afr. **5**: 203 (1895). Types: Cape, in campis graminosis pr. Uitenhage, *Bolus 1883* (K, lecto-; BOL, S); C. b. Spei, *Zeyher* s.n. (K, syn-).

Tritonixia bolusii (Bak.) Klatt in Abh. Naturf. Ges Halle **15**: 356 (1882).

Fig. 8.

Type: The holotype, *Ecklon & Zeyher 102* in B is no longer extant, according to an answer to my query to that herbarium. Isotypes were found in G, S, and SAM: in G a single plant; in SAM three specimens on the sheet, two of which are identical with that in G, and the third, with high calli on the perianth, is probably *T. laxifolia*. The sheet in S has four species on it: one is identical with that in G, the second is *T. laxifolia* or *T. securigera*, and the other two are too poor to identify. That species occurring in all three above-mentioned herbaria is regarded as *T. dubia*, as it tallies with Klatt's description.

Plants 120–150(–250) mm long. *Corm* 8–20 mm diam.; tunic fibres fine, reticulate, subparallel near the base. *Scape* 120–150(–250) mm long, erect or slightly curved, sometimes branched near the base. *Leaves* 5–8, distichous, lanceolate-ensiform, suberect to curved and spreading, acute or subacute, with a slender middle vein, sometimes reaching up to the base of the spike; cauline leaves 0–2, short and narrow. *Spike* almost secund, simple or sometimes 1–2-branched, with 5–8(–10) flowers. *Bracts* membranous, 5–10 mm long, sometimes slightly spreading; *outer* brown in the upper half, with colourless membranous margins, 3–4-toothed or irregularly toothed, or subacute; *inner* bidentate, 2-veined, as long as the outer or slightly shorter. *Flowers* regular, widely cup-shaped or almost salver-shaped, 18–25(–32) mm long, salmon-pink or orange-pink (RHS 31 B, C, 32D), with dark veins. *Perianth tube* 6–10 mm long, very narrow below, widened to 3 mm diam. at the top; *segments* subequal, ellipsoid, widely spreading, obtuse or subobtuse, 10–15(–20) × 4–6(–8) mm, without calli. *Stamens* erect, regularly placed; *filaments* 3–5 mm long; *anthers* 3–4,5 mm long, straight or later curved, pale yellow, reaching scarcely halfway up the perianth. *Ovary* 2–4 mm long; *style* erect, 7–8 mm; *stigmatic branches* spreading regularly between the anthers, 3–5 mm long, widened slightly at the tips, orange, not reaching the anther tips. *Capsule* elongated ellipsoid-trigonous, 25 mm long; *seeds* brown, 1,5–2 mm diam., with a minutely reticulate-foveate testa. *Chromosome number* 2n = 22.

Flowering period: (July–)August–September.

Distribution: Eastern Cape Province in the Port Elizabeth and Uitenhage districts (Fig. 4A).

CAPE—3325 (Port Elizabeth): Zuurberg Pass, S side (-BC), *Archibald 5252* (BOL); Between Zuurbron and Gamtoos River drift (-CC), *Fourcade 3988* (K, STE); Prope Uitenhage (-CD), *Harvey 141* (K), *Bolus 1883* (BOL, K, S), *Dahlstrand 533* (GRA), *Loubser 909* (NBG); Bronnereservaat, Uitenhage, *Olivier 2553* (STE); The Springs, Uitenhage, *Halfstrom & Lindeberg s.n.* (S); Winterhoek mts in convalle Hell's Gate kloof, *Fries e.a. 986* (S); Auf den Grasfeldern am Zwartkopsrivier (-DC), *Ecklon 102* (S partly, SAM partly), *Ecklon 141* (BOL), *Ecklon & Zeyher 141* (SAM); Prope Port Elizabeth, *Fries e.a. 334, 468* (S), *Galpin 3071* (BOL); Bluewater Bay, *Urton s.n.* (STE); Perseverance, P.E., *Rodin 1248* (BOL, K, S); Redhouse, *Paterson 44* (BOL), *Rogers 3620* (BOL); Prince Alfred's Park, P.E., *Cook* BOL *31766*; Coega (-DC), *Bayliss 1620* (B).

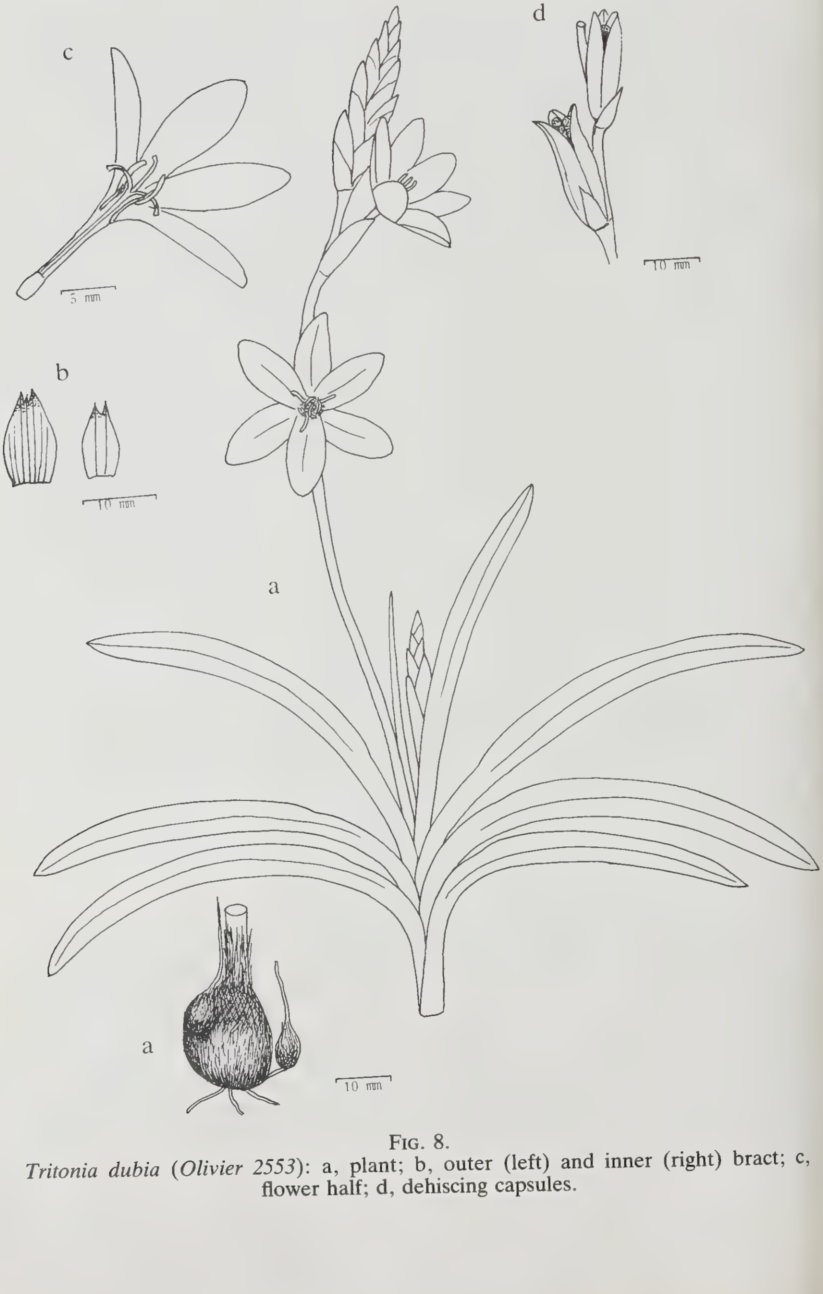

Fig. 8.
Tritonia dubia (*Olivier 2553*): a, plant; b, outer (left) and inner (right) bract; c, flower half; d, dehiscing capsules.

This species is a link between *Tritonia* and *Ixia*. It has the regular flower of an *Ixia* with the colouring of a *Tritonia*; the erect, regularly placed stamens of *Ixia*, with anthers which later often curve somewhat randomly as in *Tritonia* section *Tritonia*; the young spike is flattened in the bud stage as in *Tritonia*. What is more, the leaf margins do not have the strands of sclerenchyma of *Ixia*, but are typical of *Tritonia* with its strengthened epidermis.

2. Section PECTINATAE De Vos, sect. nov.

Folia lanceolata v. linearia v. teretia, sulcata, v. cristis longitudinalibus quatuor praedita, marginibus laevibus v. crispis v. revolutis. *Spica* densiflora, fere pectinata. *Bracteae* plerumque marginibus supernis rubrobrunneis. *Flores* zygomorphi, suberecti, albi v. rosei, fauce perianthii rubronotata, tubo bis ad ter longiore quam segmentis, segmentis anticis angustioribus quam posticis. *Antherae* violaceae.

Type species: *T. crispa* (L.f.) Ker-Gawler

Leaves lanceolate or linear or sometimes terete and grooved, or with four longitudinal flanges, the margins smooth or crisped or revolute. *Spike* dense, almost pectinate. *Bracts* usually with dark reddish-brown upper margins. *Flowers* zygomorphic, suberect, white, cream or pink, with red or purple markings in the throat, with the perianth tube twice to thrice longer than the segments, the anticous segments narrower than the posticous ones. *Anthers* violet or purple.

Distribution: South-western Cape Province from Vanrhynsdorp to Riversdale, and in the Prince Albert district of the Great Karoo (Fig. 9). Four closely related species are recognised which differ mainly in their leaf structure. Only *T. tugwelliae* has the typical ensiform unifacial leaf structure common in the Ixioideae. In the other three species the lamina is formed by two or four new outgrowths of the abaxial surface (De Vos, 1982). Two species have undulate or crisped margins.

The species are readily distinguished by their dense, almost pectinate spikes with long-tubed whitish to pinkish, zygomorphic flowers, and bracts with dark reddish-brown, crisped upper margins. The flowers are sometimes partially or wholly inverted. The anthers are contiguous and are placed towards or against the posticous perianth segment, facing the anticous side. The median anticous segment sometimes shows a slight median thickening in the throat, homologous with the calli of section *Montbretia*.

Only *T. crispa* is treated in the *Flora Capensis* as a *Tritonia*, under subgenus *Tritonia Proper*. *T. cooperi* is under *Ixia* and *T. lancea* (*Ixia lancea* Thunb.) is not mentioned. The fourth species, *T. tugwelliae*, was described later.

5. **Tritonia crispa** (L.f.) Ker-Gawler in Curtis's Bot. Mag. **18** t.678 (1803), excl, syn. *Gladiolus laceratus* Burm.

Plants (180–)250–350(–450) mm long. *Corm* cone-shaped, 10–20(–30) mm diam.; tunic fibres fine, almost parallel. *Scape* (150–)250–350(–450) mm long, suberect or slightly bent, simple or with 1–3 branches, with a collar of old leaf bases 30–80 mm long around its base. *Leaves* 3–6(–8), linear-lanceolate, acute or acuminate, suberect, (100–)200–300(–400) × (5–)10–15(–25) mm, usually with crisped, often ciliolate margins and with a prominent middle vein, reaching up to the base of the spike; cauline leaves 1–3, linear, up to 150 mm long. *Spike* dense, secund, with 4–12 or more flowers, often slightly bent to give it a pectinate appearance. *Bracts* membranous, sometimes greenish in the lower portion, with dark reddish-brown upper margins, (5–)7–12(–15) mm long; outer irregularly 3-toothed or slightly lacerated or obtuse, with crisped upper margins; inner bidentate, as long as or slightly shorter than the outer. *Flowers* zygomorphic, suberect, (40–)50–80(–110) mm long, cream, pale yellow, shell pink or salmon pink (RHS 37C, D), with a red or purple centre and median stripe on the anticous perianth segments. *Perianth tube* (20–)40–50(–70) mm long, cylindrical in the lower half, widened gradually to 7 mm diam. in the upper portion, slightly curved, 2,5–3 times longer than the segments; *segments* unequal, (12–)15–20(–25) mm long, the posticous segments suberect, obovate-spathulate, 5–13 mm wide, the others spreading, 3–10 mm wide, the three lower ones oblanceolate, narrower than the others. *Stamens* almost central; *filaments* 8–12 mm long, erect; *anthers* 3–6 mm long, dark purple or purplish-black, facing the anticous side, reaching scarcely halfway or up to three-quarters up the perianth segments. *Ovary* subglobose, 3–5 mm long; *style* (32–)40–70(–85) mm, erect; *stigmatic branches* 3–6 mm long, overtopping the anthers. *Capsule* shortly ellipsoid-trigonous, ca. 7 mm long; *seeds* brown, shiny, minutely reticulate-foveate, 2 mm diam. *Chromosome number* $2n=22$.

Flowering period: late September to December.

Distribution: Widely distributed in the western and south-western Cape from Vanrhynsdorp to the Cape Peninsula and Worcester and to Caledon (Fig. 9A).

T. crispa is readily distinguished by its long-tubed flowers borne in a dense, almost pectinate spike, its bracts with dark reddish-brown, slightly crisped upper margins, and by a type of unifacial leaf formed by two longitudinal outgrowths from the abaxial surface (De Vos, 1982), and usually with crisped margins. The flowers are often somewhat inverted, with the anticous segments in the posterior or lateral position.

Ker-Gawler (1803) transferred *Gladiolus crispus* L.f. to *Tritonia*, tenta-

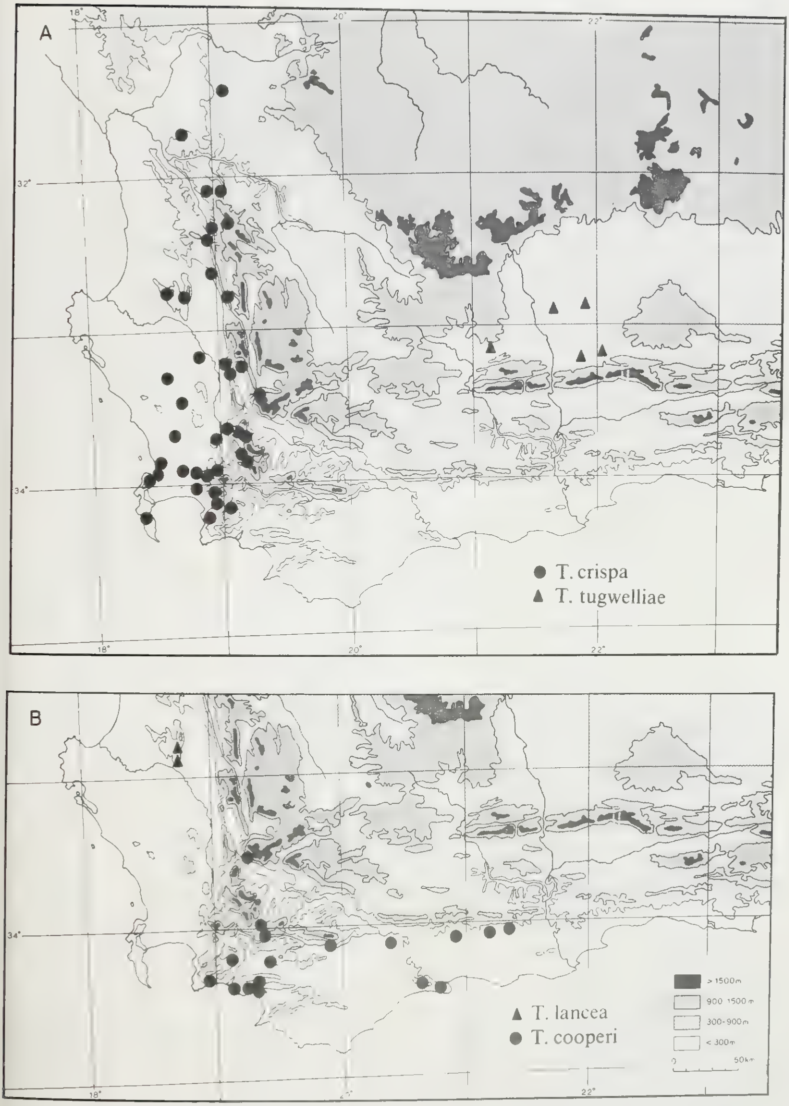

FIG. 9.
Geographical distribution of *Tritonia* section *Pectinatae*: A, *T. crispa* and *T. tugwelliae*; B, *T. lancea* and *T. cooperi*.

tively citing as synonym also *G. laceratus* Burm. Prodr., with a question mark. Baker (1877) accepted Ker-Gawler's citation of Burman's species and named the species *Montbretia lacerata*; but in 1892 and 1896 he used Ker-Gawler's name for the species, citing as synonyms *G. crispus* L.f. and also *G. laceratus* Burm. without any reservations. When investigating the South African Iridaceae in Burman's herbarium in Geneva, N.E. Brown (1929) found no type of *G. laceratus;* nor has a type been found during the present investigation. Burman's synoptic description of the species (1768), "foliis ensiformibus laceris, floribus secundis, tubo filiformi longissimo" is too vague to connect his species unequivocally with *T. crispa*, as it can also be the description of a species belonging to several other Iridaceous genera. For this reason Burman's epithet *laceratus* is unacceptable for the present species.

Baker's *T. crispa* var. *pectinata* is a different species, namely *T. lancea*. His var. *grandiflora* is incorporated with the typical variety, as a series of intermediate sizes occurs between this variety and the typical variety. His var. *parviflora* is accepted.

a. var. **crispa** (L.f.) Ker-Gawler in Curtis's Bot. Mag. **18** t. 678 (1803), excl. syn. *Gladiolus laceratus;* & in Kon. & Sims, Ann. Bot. **1**: 228 (1805); Ait. Hort. Kew. ed. 2, **1**: 90 (1810); Klatt in Linnaea **32**: 756 (1863); Bak. Handb. Irid. 192 (1892) & in Fl. Cap. **6**: 122 (1896), excl. var. β & δ syn. *Gladiolus laceratus;* Lewis in Adams. & Salter, Fl. Cape Penins. 250 (1950).

Gladiolus crispus L.f. Suppl. 94 (1781); Thunb. Diss. Gladiolo **10** & t. 1 f. 2 (1784) & Fl. Cap. 191 (1811); Ait. Hort. Kew. Add. 481 (1789); Jacq. Ic. t. 267 (1789) & Coll. **5**: 27 (1796); Andr. Bot. Rep. t. 142 (1797); Willd. Sp. Pl. **1**: 210 (1797). Type: Cape, *Sparrman 123*, sub *Gladiolus crispus* (LINN 59.18, holo-).

Freesea crispa (Ker-Gawl.) Eckl. Top Verz. 30 (1827), nom. illeg., gen. non descr.

Montbretia lacerata Bak. in J. Linn. Soc. **16**: 168 (1877), excl. var. *pectinata* & syn. *Gladiolus laceratus*.

Tritonia lacerata (Bak.) Klatt in Abh. Naturf. Ges. Halle **15**: 358 (1882), excl. syn. *G. laceratus*.

T. laccata Klatt in Dur. & Schinz, Consp. Fl. Afr. **5**: 205 (1895), orth. var.

Icones: Curtis's Bot. Mag. t. 678; Jacq. Ic. t. 267; Andr. Bot. Rep. t. 142; this work **Fig. 10.**

Bracts 7–12(–15) mm long. *Flowers* more than 50 mm long. *Perianth tube* longer than 28 mm. *Style* longer than 40 mm.

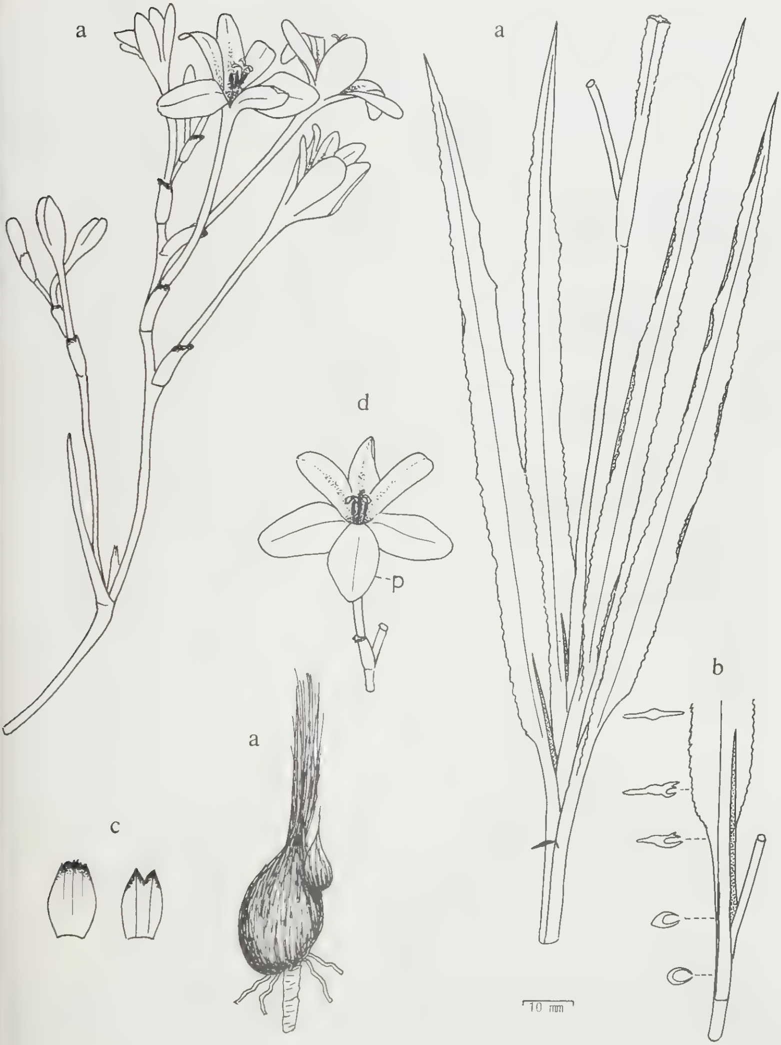

FIG. 10.
Tritonia crispa (*De Vos 2435*): a, plant; b, leaf sheath and base of lamina; c, outer (left) and inner (right) bract; d, inverted flower; p, posticous perianth segment.

CAPE—3118 (Vanrhynsdorp): Gifberg slopes (-DB), *Goldblatt 346* (BOL), *Barker 9577* (NBG), *Werderman & Oberdieck 498* (PRE): Summit of Gifberg Pass, *Hall 3898* (NBG).
—3119 (Calvinia): Nieuwoudtville (-AC), *Leipoldt* BOL *3174*.
—3218 (Clanwilliam): Pakhuis Pass (-BB), *Middlemost 1910* (NBG); Uitkyk Pass between Alpha & Algeria (-BD), *Goldblatt 3270* (MO); Boontjiesrivier near Citrusdal (-DB), *Pillans 9840* (BOL); Olifants River valley, *Leipoldt* BOL *17110;* Piketberg (DA), *Bolus s.n.* Oct. 1892 (BOL), *Barker 7577* (NBG),*Drège s.n.* (K); Base of Kapiteinskloof, *Pillans 7812* (BOL).
—3219 (Wuppertal): Krakadouwhoogte & Boskloof (-AA), *Leipoldt 540* (SAM); Cedarbergen (-AC), *Thode A2181* (PRE); The Baths, Citrusdal (-CA), *Emden 80* (PRE).
—3318 (Cape Town): Malmesbury near Oudepost (-BC), *Acocks 15231* (PRE, BM); Towards Heuningberg (-BB), *Thomas s.n.* Oct. 71 (STE, NBG); Malmesbury (-BC), *Hall 165* (NBG), *Goldblatt 3134* (MO); Signal Hill (-CD), *Marloth 11456* (BOL); Sub Kasteelpoort, *MacOwan 2389* (K); Lion's Head, *Wolley-Dod 3648* (BOL); Lion's Rump, *Pappe s.n.* (K); Paarden Eiland, *Ecklon s.n.* Sept. 1828 (SAM); Am Meeresstrand und bei Rietvalei, *Zeyher 4020* (S); Blaauberg, *Zeyher 4020* (SAM); Klipheuwel farm (-DA), *Joubert s.n.* Oct. 46 (NBG); Paarl (-DB), *Prior* PRE *36539*, *Prior s.n.* (K); Paarl Mountains, *Drège 1840* (K); Langverwacht above Kuilsrivier (-DC), *Oliver 4795* (PRE); S spur of Kanonkop, *Acocks 1351* (S); Between Cape Town and Stellenbosch (-DC-D), *Hafstrom s.n.* Nov. 34 (S); Stellenbosch flats (-DD), *Duthie 213* (STE-U); Papegaaisberg (-DD), *Taylor 7843* (STE); Jonkershoek, *Kerfoot 6102* (NBG), *Garside 1168A* (K), *Kruger 82* (STE); Joostenberg, *Mathews s.n.* Oct. 37 (BOL); Banhoek, *Martley* BOL *31744*; Ida's Valley catchment, *Taylor 9274* (PRE); Beside Helshoogte road, *Acocks 3600* (S).
—3319 (Worcester): Distr. of Worcester, *Cooper 1510* (BOL, K); Saron (-AA), *Thudichum* BOL *31746*; Prope Saron, *Schlechter 10625* (PRE G, L, S, BM, MO); Slopes of Roodesandberg, *Compton* e.a. *1882/36* (NBG); Tulbagh (-AC), *Ecklon 107* (SAM), *Ecklon s.n.* (C, S); Near Tulbagh waterfall, *Isaacs* BOL *31745*; Witelskloof off Mitchells Pass (-AD), *Esterhuysen 14156* (BOL); Du Toitskloof (-CA), *Pillans 8491* (BOL), *Hall s.n.* Nov. 49 (NBG); Groenberg, *Van Rensburg 7* (PRE, MO), *Grant 7* (BM); Bainskloof, *Grant 2237* (MO); Franschhoek (-CC), *Phillips 1317* (SAM); Wemmershoek Valley, *Esterhuysen 17676* (BOL, PRE); Klein Drakenstein mts., *Kruger 1531* (STE).
—3418 (Simonstown): Near Somerset West (-BB), *Martley s.n.* Dec. 30 (BOL); Skapenberg, Somerset West, *Lewis 5675* (NBG, STE); Sir Lowry's Pass, *Barker 3378* (NBG, STE), *MacOwan 2996* (SAM); Hottentots Holland bergen, *Bolus 5254* (BOL), *MacOwan 1657* (SAM, BM, K, G), *Stokoe 6166* (BOL), *Zeyher 1265* (S); Kogelbaai bridge (-BD), *Boucher 908* (PRE, STE).
—3419 (Caledon): Prope Grabouw, Palmiet River (-AA), *Bolus 4212* (BOL).
Without precise locality: Thunberg Hb. *1018* (UPS); *Thunberg* sub *Gladiolus crispus* (S); *Sparrman 123* (LINN); *Drège Irid. 106* (G).

The flowers of Lewis's collection no. *5675* (NBG, STE) from Skapenberg above Vergelegen, Somerset West, have shorter perianth tubes (25–28 mm) which are only slightly longer than the segments, and shorter styles (32–35 mm). It was identified as *T. undulata* (Burm. f.) Bak., but is not this species. Its other characteristics fit *T. crispa* and it is regarded as a luxuriant form of the latter.

b. var. **parviflora** Bak. Handb. Irid. 192 (1892) & in Fl. Cap. **6**: 122 (1896). Syntypes: C.b.S. without precise locality, *Thom s.n.* (K, lecto-); Winterhoek, Tulbagh, *Pappe s.n.* (K). These two collections are on a single herbarium sheet. The former, comprising two scapes with little crispulation, is probably what Baker described as "leaves linear, not crisped", and is therefore chosen as lectotype.

Bracts 5–7 mm long. *Flowers* 30–40(-45) mm long. *Perianth tube* (18–)20–25(–28) mm long; *segments* ca. 8–10 mm long. *Style* 20–28(–33) mm.

CAPE—3219 (Wuppertal): Hill slopes about 4 mls SE of Citrusdal (-CA), *Barnard* SAM *68459.*
—3318 (Cape Town): Stellenbosch flats (-DD), *Garside 70* (K).
—3319 (Worcester): Winterhoek, Tulbagh (-AA), *Pappe s.n.* (K); Tulbagh (-AC), *Hofmeyr* STE *16962, Theron* STE *16965, Ecklon s.n.* (C).
—3418 (Simonstown): Prom. b. Spei (AB/D), *Masson* (BM).
Without precise locality: *Thom* (K); *Ecklon 106* (B); *Verreaux* (G); *Pappe* SAM *21195*; *Roxburg* (BM); sub *Freesea crispa & Ixia undulata* (L); sub *Gladiolus crispus & Freesea crispa* (S).

6. **Tritonia lancea** (Thunb.) N.E.Br. in J. Linn. Soc. Bot. **48**: 48 (1928). Type: C. b. Sp., infra Piketberg, Thunberg Hb. *963* (UPS, holo-).

Ixia lancea Thunb. Diss. Ixia 18 (1783) & F1. Cap. 246 (1811); Willd. Sp. P1. **1**: 206 (1797), excl. cit. Jacq.; Vahl, Enum, P1. **2**: 62 (1805); non Jacq. 1790 & 1796.

Ixia pectinata Vahl, Enum. P1. **2**: 62 (1805). Type: Cap. b. Sp., Hb. Vahl (C, holo-).

Tritonia pectinata (Vahl) Ker-Gawl. in Curtis's Bot. Mag. sub t. 1275 (1810); Klatt in Abh. Naturf. Ges. Halle **15**: 358 (1882) & in Dur. & Schinz, Consp. F1. Afr. **5**: 207 (1895).

Montbretia lacerata Bak. var *pectinata* (Vahl) Bak. in J. Linn. Soc. **16**: 168 (1877).

Tritonia crispa (L.f.) Ker-Gawl. var. pectinata (Vahl) Bak. Handb. Irid. 192 (1892) & in F1. Cap. **6**: 122 (1896).

Plants (100–)150–250(–280) long. *Corm* ovoid, 10–20 mm diam.; tunic fibres fine, matted, largely parallel but elongated-reticulate towards the top. *Scape* simple, (100–)150–250(–280) mm long, often slightly flexuose, with a fibrous collar of old leaf bases 40–50 mm long around its base. *Leaves* 4–5, linear-lanceolate or lanceolate, suberect, acute or acuminate, with inrolled margins, (50)100–200(–280) × 2–7(–10) mm, with a prominent middle vein seen from one side, often contracted between the sheath and blade into a petiole-like portion up to 100 mm long and 0.5–1.5 mm diam.; cauline

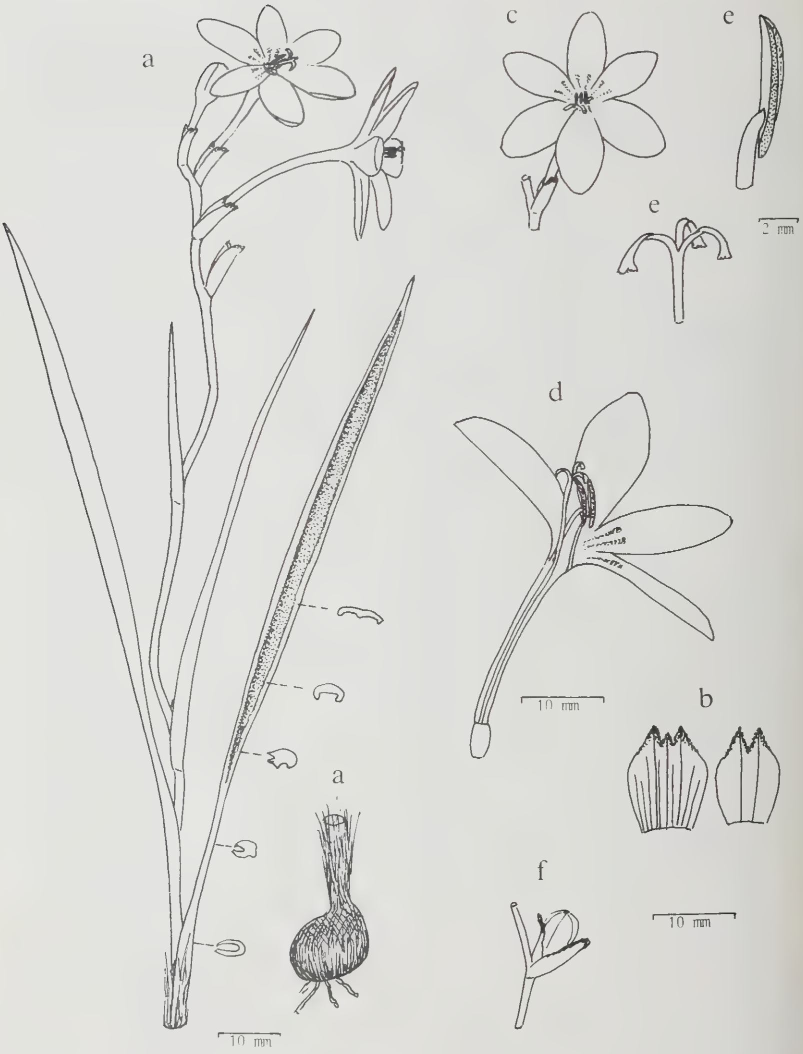

FIG. 11.
Tritonia lancea (*De Vos 2450*): a, plant, with one flower semi-inverted; b, outer (left) and inner (right) bract; c, inverted flower; d, flower half in a median cut; e, stamen and style branches; f, capsule.

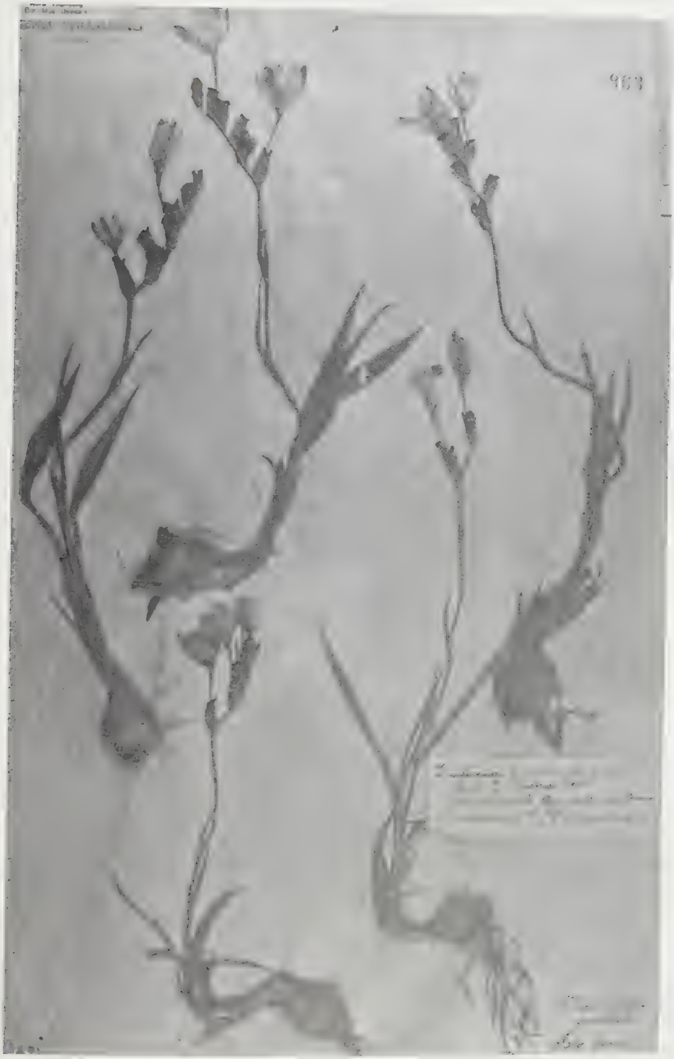

FIG. 12.
Tritonia lancea, holotype in the Thunberg herbarium, UPS.

leaves 1–2, terete towards the tip, up to 70 mm long, 1–2 mm wide. *Spike* somewhat secund and pectinate, simple, with 2–7 suberect flowers, rarely reduced to a single flower. *Bracts* membranous, with dark reddish-brown, minutely crisped upper margins, 7–10(–12) mm long; outer shortly 3-toothed or irregularly toothed, finely veined; inner shortly bidentate, 2-veined, often with a greenish base. *Flowers* slightly zygomorphic, salver-shaped, often inverted, (32–)40–50 mm long, white, with two short red lines on each anticous segment, with the tube and outer segments brownish-red on the backs. *Perianth tube* (17–)20–25 mm long, cylindrical for most of its length, widened slightly at the top to 5 mm diam.; *segments* subequal in length, spreading, oblanceolate or oblong, obtuse, rarely slightly emarginate, 12–18 mm long, the posticous segments 7–10 mm wide, anticous 5–7 mm wide. *Stamens* curved slightly towards the posticous side; *filaments* 6–7 mm long, white; *anthers* 5 mm long, violet, reaching half-way up the perianth segments; pollen white. *Ovary* 3 mm long; *style* 22–30 mm long, white; *stigmatic branches* 3–4 mm long, reaching or overtopping the anther tips. *Capsules* shortly ellipsoid, 5–7 mm long; *seeds* ca. 1 mm diam., brown, testa colligulate.

Flowering period: late August to September.
Distribution: Foot, lower slopes and top of Piketberg (Fig. 9B).

CAPE—3218 (Clanwilliam): Top of Piketberg (-DC), *De Vos 2406* (STE); De Hoek (-DD), *Lewis 1850* (SAM), *Barker 7327, 4677* (NBG).

Without precise locality: *Thunberg 963* (UPS); Hb. Vahl. sub *Ixia pectinata* (C); *Masson* sub *Gladiolus pectinatus* (BM partly). (Masson's "prom. b. Spei" on the herbarium sheet probably does not refer to the Cape Peninsula but to the Cape in general.)

This species is distinguished by white salver-shaped flowers with red markings, arranged in an almost pectinate spike, and by leaves which have a lanceolate or linear-lanceolate lamina with inrolled margins and often an almost terete contracted middle portion between the lamina and sheath. The flattened unifacial lamina is formed by two outgrowths of the abaxial surface (De Vos, 1982).

T. lancea has a limited distribution on the slopes and on top of Piketberg, where it is still quite common. Thunberg indicated his locality as "infra Piketberg" (1811) in the first edition of his *Flora Capensis*.

Ixia pectinata Vahl, with its holotype in C, is this species; Vahl's name is therefore a later synonym. He probably did not see the type of *I. lancea*, as he questioned (1805) under *I. pectinata*: "An eadem cum Ix. lanceae Thunbergii?"

Masson's collection in BM labelled *Gladiolus pectinatus*, comprises two species, namely *T. lancea* and *T. cooperi*. This resulted in the wide-leaved specimens of *T. cooperi* being misidentified as *T. pectinata* and *T. crispa* var. *pectinata* in some South African and overseas herbaria. (See further under *T. cooperi*.)

T. lancea is closely related to *T. crispa*.

7. **Tritonia cooperi** (Bak.) Klatt in Abh. Naturf. Ges. Halle **15**: 358 (1882).

Plants (200–)400–600 mm long. *Corm* 15–30 mm diam., ovoid; tunic fibres very fine, matted, almost parallel towards the base, elongated-reticulate towards the top. *Scape* (120–)200–600 mm long, simple or with one branch, with a collar of old leaf bases 40–70 mm long around its base. *Leaves* 4–6, grooved, terete or almost quadrangular or with four longitudinal flanges (H-shaped or X-shaped in transverse section), acuminate or acute, with straight, sometimes sparsely ciliolate margins, (200–)300–500 × (0,5–) 2–7(–10) mm, with a strong vein in the middle, reaching to the base or top of the spike; cauline leaves 1–2, linear, acuminate, 30–120 mm long. *Spike* dense, secund, pectinate, often slightly bent at its base, with 5–10 flowers, sometimes with one branch. *Bracts* membranous, sometimes greenish towards the base, with dark reddish-brown upper margins, 5–10(–13) mm long; *outer* with a wide, irregular or shortly 3-toothed, crisped upper margin; *inner* shortly bidentate, 2-keeled upwards, equal to or slightly longer or shorter than the outer. *Flowers* zygomorphic, erect to suberect, often half inverted, (45–)60–75(–80) mm long, white or cream, becoming pink with age, with red or purple markings in the throat, often pink outside. *Perianth tube* largely cylindrical, widened gradually in the upper half or quarter, to 5–8 mm diam. at the top, often slightly curved, (30–)40–55 mm long, ca. 2 to 3 times longer than the segments; *segments* unequal, obtuse, somewhat spreading, 12–18(–24) mm long, posticous segments elliptical to obovate-spathulate, (5–)10–13(–18) mm wide, the median one slightly wider than the laterals, the anticous segments oblanceolate-spathulate, (4–)6–9 mm wide. *Stamens* slightly curved towards the posticous perianth segment; *filaments* 8–12(–16) mm long, pale; *anthers* 4–6(–8) mm long, dark violet, reaching halfway to three-quarters up the perianth segments; pollen violet. *Ovary* 2,5–4 mm long; *style* (42–)50–65 mm long, suberect; *stigmatic branches* 3–5(–7) mm long, often overtopping the anthers.

Flowering period: November to December

Distribution: In the districts of Worcester, and Caledon to Riversdale (Fig. 9B).

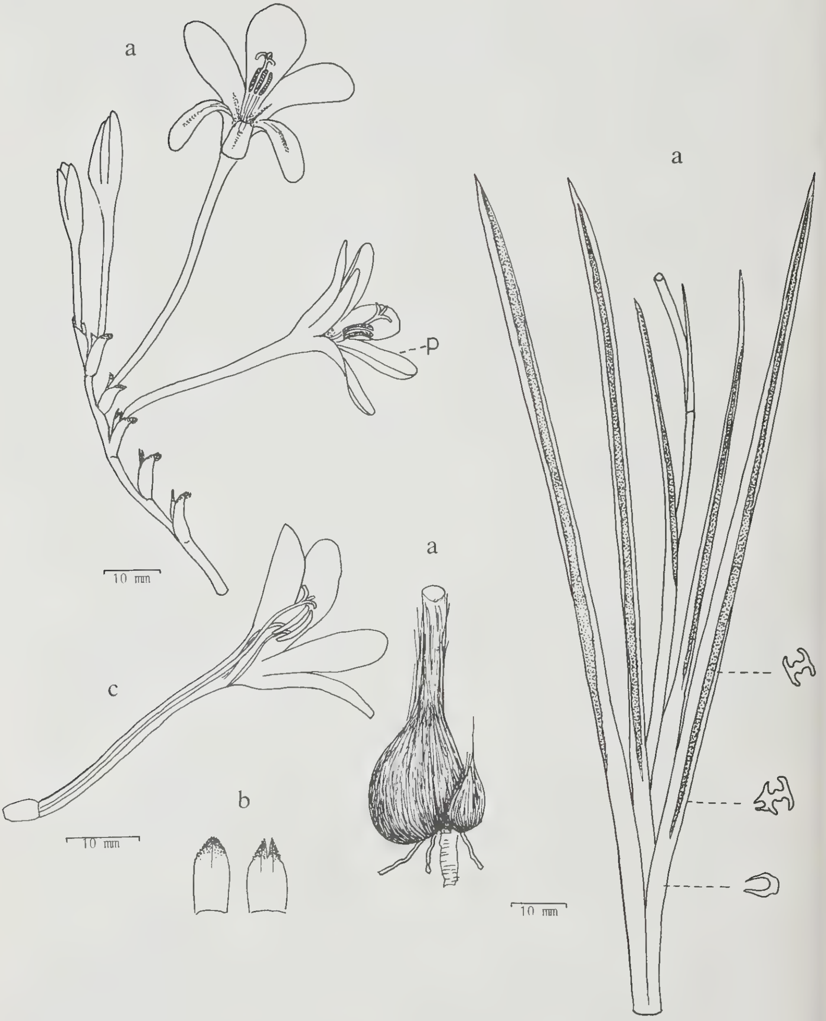

FIG. 13.
Tritonia cooperi var. *quadrialata* (*De Vos 2439*): a, plant with one flower inverted; b, outer (left) and inner (right) bract; c, half of flower in a median cut.

This species was described as *Morphixia cooperi* by Baker (1876) and transferred to *Tritonia* by Klatt (1882). In 1892 and 1896 Baker combined *Morphixia* with *Ixia* and the species became *Ixia cooperi*. At the same time Baker described a different species as *Tritonia cooperi*, based on a different collection of Cooper. (As this is a later homonym of *T. cooperi* Klatt, Foster (1936) renamed that species *T. quinquenervata*, an unnecessary name, as L. Bolus (1929) had already shown it to be no *Tritonia* and had named it *Watsonia cooperi* (Bak.) L. Bol.—see Lewis, 1941).

The younger Linnaeus described *Gladiolus longiflorus* (1781) and cited a specimen of Thunberg. There is no Thunberg specimen so named in the Linnean herbarium (only of Sparrman which is *Acidanthera* and which cannot be considered as representing the type of *G. longiflorus* L.f., according to N. E. Brown, 1928). In Thunberg's herbarium in UPS are two sheets, labelled *G. longiflorus* α and β respectively. They represent two species: α (sheet No. *1040*) is *Tritonia bakeri* and β (sheet No. *1041*) is *T. cooperi*. (Brown did not realise that two species were involved.) One of these should be regarded as the type of Linnaeus's name. His short diagnosis fits both sheets equally well, and Thunberg's more detailed description in *Dissertatio de Gladiolo* (1784), although incorporating both species, fits β best. The name *T. longiflora* cannot, however, be accepted for either species, as it is a later homonym of *T. longiflora* (Curtis) Ker-Gawler (1805) (which belongs in the genus *Ixia*). Brown, aware of this, suggested (1928) that the combination *T. longiflora* (L.f.) N.E. Br. be conserved; but Foster (1936) renamed the species *T. longituba* Foster, unaware that valid names, *T. cooperi* and *T. bakeri*, were available for it. As Linnaeus's name *G. longiflorus* may be regarded as referring to both sheets of Thunberg, it is cited in the present revision with both *T. cooperi* and *T. bakeri*.

T. cooperi is distinguished by its white, cream or pale pink, long-tubed flowers which often become darker pink with age, and which are arranged in a dense pectinate spike; and by narrow, terete, four-grooved leaves, or wider four-flanged leaves which are X-shaped or H-shaped in transverse section. The four flanges are pressed flat in herbarium material, giving the leaves a linear-lanceolate outline. The species differs from *T. lancea* in this, as well as in its more zygomorphic, larger flowers with longer perianth tube and longer style.

Two subspecies are recognised, differing mainly in leaf width: subspecies *cooperi*, with narrow, four-ridged leaves, occurs mainly on stony hills and mountain slopes; whereas subspecies *quadrialata*, with wider four-flanged leaves, is generally found in more mesophytic habitats usually at lower altitudes. Basically the leaf structure is similar in the two subspecies, the four wide longitudinal flanges of the latter subspecies being wider outgrowths of the ridges between the grooves of the narrow leaves of the former. A few collections, e.g. *Schlechter 29386* in BOL, from the vicinity of Cape Infanta, have specimens which seem to connect the two subspecies.

KEY TO THE SUBSPECIES

Leaves terete, grooved, or X-shaped in transverse section, 1–2(–6) mm in diam. .... a. subsp. **cooperi**

Leaves with four wide longitudinal flanges, H-shaped in transverse section, 6–10 mm wide .... b. subsp. **quadrialata**

a. subspecies **cooperi**

Tritonia cooperi (Bak. 1876, non 1892, nec 1896) Klatt in Abh. Naturf. Ges. Halle **15**: 358 (1882).

Morphixia cooperi Bak. in J. Bot. Lond. **14**: 237 (1876) & in J. Linn. Soc. **16**: 98 (1877). Syntypes: Cape, district of Worcester, *Cooper 1683* (K, lecto-); same locality, *Cooper 1628* (K).

Ixia cooperi (Bak.) Bak. Handb. Irid. 166 (1892) & in Fl. Cap. **6**: 84 (1896).

Gladiolus longiflorus L.f. Suppl. Pl. 96 (1781) in part; Thunberg, Diss. Glad. 19 (1784) in part, excl. syn. Berg. & Delar. & spec. α in Hb. Thunb; & Fl. Cap. **1**: 207 (1811) in part. Non Jacq. (1789), nec Vahl (1805). Type: Thunberg Hb. *1041* (UPS, lecto-).

Tritonia longiflora (L.f.) N.E. Br. in J. Linn. Soc. **48**: 25 (1928) in part, excl. spec. α in Hb. Thunberg, hom. illeg.; non Ker-Gawl. (1805), nec Ait. (1810 = *Ixia paniculata* Delar.)

T. longituba Foster in Contr. Gray Herb. N.S. **114**: 45 (1936) in part. Type as for *Gladiolus longiflorus* L.f.

Leaves terete, narrowly or widely 4-grooved, X-shaped in transverse section, 1–2(–6) mm wide, as long as the scape. *Bracts* 5–10 mm long. *Perianth tube* (30–)40–55 mm long; *segments* 12–18 mm long.

Often on stony hills, mountain slopes and ridges.

CAPE—3319 (Worcester): District of Worcester, *Cooper 1628, 1683* (K); Slanghoek Needle, SW slopes at foot (-CA), *Esterhuysen 17768* (BOL); Mountainside, Elandskloof near Villiersdorp (-CD), *Galpin 12379* (PRE).
—3419 (Caledon): Houhoek (-AA), *Schlechter 291* (PRE), *9385* (PRE, K, S), *Lewis 5312* (NBG, STE, MO), *Loubser 2144* (NBG); Caledon (-AB), *Jones s.n.* (STE); Donkerhoekberg, Caledon, *Zeyher* SAM *21226*; Hermanus, Die Mond (-AD), *Erens 2769* (PRE); Onrust River, stony slopes (-AC), *Esterhuysen 19278* (BOL).
—3420 (Bredasdorp): Swellendam, am Berge bei Puspasvalei, Voormansbosch etc. (70.10), *Irid 96* (G, not MO); Bontebok Park, Swellendam (-AB), *Grobler 545* (STE), *Marais 68* (PRE); Grootvadersbos, Heidelberg (-BB), *Barker 8827* (NBG, C, MO, S).

—3421 (Riversdale): Foot of Langebergen between Vet River and Krombeks River (-AA), *Burchell 7183* (K); Corenterivier farm, *Muir 5365* (BOL, PRE), *5366* (PRE); Glen, rocky slopes (-AB), *Muir 3022* (BOL).

Without precise locality: Cap. bon. Spei, Thunberg Hb. *1041* (UPS); Thunberg Hb. ann. 1774 (S); Prom. b. Spei, *Masson* (BM partly).

This subspecies has sometimes been confused with *T. bakeri*, e.g. in Thunberg's herbarium in UPS, on account of its narrow leaves and long-tubed flowers. It is, however, readily distinguished by its dense pectinate spike with zygomorphic flowers and by its 4-ribbed leaves.

b. subspecies **quadrialata** De Vos, subsp. nov.

A subspecie typica foliis laterioribus, quadrialatis differt.

Type: Cape, Potberg, Bredasdorp, *Tropper s.n.* 16–11–65 (STE, holo-).

Leaves with four longitudinal flanges, H-shaped in transverse section, (seemingly linear-lanceolate in herbarium specimens), 6–10 mm wide, reaching up to the base of the spike or higher. *Bracts* 7–13 mm long. *Perianth tube* 35–45(–50) mm long; *segments* 15–18(–24) mm long.

CAPE—3418 (Simonstown): Betty's Bay, Porter Reserve (-BD), *Topper NBG 77197*; Betty's Bay, *Brunt* BOL *31748*.

—3419 (Caledon): Kleinmond flats (-AC), *Cloete* NBG *70754*; Onrust River mountain, S.E. slopes, *Esterhuysen 4234* (BOL), *19278* (SAM); Botrivier–Hawston road, *Barnard* NBG *93824*; Protea farm near Botrivier, *Thomas* NBG *70506*; S foot of Riversonderend mts. near Sonderend (-BB), *Esterhuysen 23793* (PRE).

—3420 (Bredasdorp): Bontebok Park, Swellendam (-AB), *Acocks 22893* (PRE); Potberg (-BC), *Tropper s.n.* 16–11–65 (STE); Rietfontein near Cape Infanta (-BD), *Esterhuysen 29386* (BOL).

Without precise locality: *Roxburgh s.n.* (G).

This wide-leaved subspecies has been misidentified in South African and some overseas herbaria as *T. pectinata* Ker-Gawler or *T. crispa* var. *pectinata* Baker. This is on account of Masson's collection in BM which is labelled *Gladiolus pectinatus*, a manuscript name of Solander, and also *T. pectinata* Gawl., and is believed to be the type material of *T. pectinata*. This collection comprises four specimens belonging to two species: three specimens are identical with a specimen named *Ixia pectinata* Vahl in C. As Ker-Gawler cited Vahl when he published the combination *T. pectinata* (1810), the holotype of the latter is this specimen in Copenhagen which, on examination proved to be identical with the type of *T. lancea* (Thunb.) N.E. Br., in Thunberg's herbarium in UPS. *T. pectinata* and *T. crispa* var. *pectinata* are therefore synonyms of *T. lancea* and are not the present subspecies. The fourth specimen of Masson's collection, left without a valid name, is a widleaved, large-flowered form of *T. cooperi* and is now supplied with the epithet *quadrialata*, on account of its four-flanged leaves.

Seedlings and plants still too young to flower have their two basal leaves linear-lanceolate and 2-flanged, with inrolled margins, resembling the leaves of *T. lancea*. Specimens of *Horn s.n.*, 25 Oct. 1958, in NBG, from Van der Wattskraal, Riviersonderend, Swellendam, also have flat leaves, up to 20 mm wide, with inrolled margins as in *T. lancea*. The inflorescence and flowers, however, are this species.

8. **Tritonia tugwelliae** L. Bol. in Ann. Bol. Herb. **4**: 45 (1926). Type: Cape, near Prince Albert, *Tugwell s.n.* BOL *13487* (BOL, holo-).

Plants (100–)150–250(–300) mm long. *Corm* 10–22 mm diam., conical; tunic fibres strong, elongated-reticulate. *Scape* (100–)150–250(–300) mm long, curved below the spike, sometimes with one branch. *Leaves* 4–5, linear-lanceolate, falcate, spreading or recurved, 50–100 x 3–7(–9) mm, with undulate or crisped or sometimes straight margins, with a slender middle vein. *Spike* dense, secund, pectinate, with 5–10 or more flowers. *Bracts* membranous, pale to pale reddish-brown, with narrow, pale, papery margins, 3–8 mm long; *outer* obtuse, acute or shortly 3-toothed, veined; *inner* 2-dentate, with 2 veins. *Flowers* zygomorphic, suberect, 32–40 mm long, white, with a small red or purple spot on the lower perianth segments. *Perianth tube* (20–)24–30 mm long, cylindrical in the lower half, widened gradually in the upper to 3 mm diam., segments oblong-spathulate, 7–9 × 2–3 mm, the lower slightly narrower than the upper. *Stamens* slightly bent; *filaments* 3–4 mm long; *anthers* ca. 3 mm long, at first blue, reaching about halfway up the perianth segments. *Ovary* ca. 2 mm long; *style* (24–)27–33 mm long; *stigmatic branches* ca. 2 mm, reaching or overtopping the anther tips.

Flowering period: September.

Distribution: South-western part of the Great Karoo, from Prince Albert towards Leeugamka and Laingsburg (Fig. 9A).

CAPE—3221 (Merweville): 3,5 mls N of Prince Albert Road station (-DC), *Acocks 17106* (PRE); 7 mls S of Fraserburg station (-DD), *Zinn* SAM *59771*.
—3321 (Ladismith): 27 mls NE of Laingsburg towards Beaufort West (-AA), *Lewis 3490* (PRE); 20 mls W of Prince Albert (-BB), *Leistner 240* (PRE).
—3322 (Oudtshoorn): Prope Prince Albert (-AA), *Tugwell* BOL *13487*; Prince Albert, "flowering in my garden", *Marloth 11455* (PRE).
Without precise locality: Roggeveld, hb. Worsdell (K).

This species, found only in a small area of about 80 by 55 km in the Great Karoo, is readily distinguished by its white, long-tubed flowers arranged in a pectinate spike and by leaves usually with undulate-crisped margins. Its leaves resemble *T. crispa* superficially, but are softer in texture, usually bent, and of the ordinary ensiform-unifacial type. It differs from the latter species further in its smaller flowers, bracts without dark upper margins, and corm tunics with stouter fibres arranged in an almost regular reticulation.

3. Section TERETIFOLIAE De Vos, sect. nov.

Folia teretia v. subteretia, valida, striata ubi exsiccata, pluribus filis validis sclerenchymatis praedita. *Bracteae* herbaceae in dimidio inferiore. *Flores* zygomorphi, plerumque inversi, fere rubinei, tubo perianthii ca. duplo longiore quam segmentis, segmentis interioribus laterioribus quam exterioribus.

Type species: T. kamisbergensis Klatt

Corm deep underground. *Leaves* terete or subterete, wiry, striate when dry, with several strong strands of sclerenchyma. *Bracts* herbaceous in the lower half. *Flowers* zygomorphic, usually inverted, almost ruby-red, the perianth tube obliquely funnel-shaped, about twice the length of the segments, and the inner segments wider than the outer. *Stamens* curved against the posticous perianth segment, with the anthers contiguous and facing the anterior side of the flower.

Distribution: Kamiesberg, Namaqualand.

This section has a single species which shows several features not typical of *Tritonia* generally, such as the deep-seated corm, wiry, filiform leaves, bracts which remain herbaceous in their lower portion, and almost ruby-red flowers with two slight protuberances on the perianth tube where the two posticous stamens are inserted.

9. **Tritonia kamisbergensis** Klatt in Linnaea **32**: 760 (1863) & in Dur. & Schinz, Consp. Fl. Afr. **5**: 205 (1895); Bak. Handb. Irid. 193 (1892) & in Fl. Cap. **6** 123 (1896). Type: Cape, Kamiesbergen, *Ecklon & Zeyher 109* (B, holo-; SAM).

Montbretia kamisbergensis (Klatt) Bak. in J. Linn. Soc. **16**: 169 (1877).

Tritonixia kamisbergensis (Klatt) Klatt in Abh. Naturf. Ges. Halle **15**: 356 (1882).

Freesea kamisbergensis Eckl. in herb.

Fig. 14.

Plants 500–700 mm long or sometimes longer. *Corm* deep-seated, asymmetrical; tunic fibres fine, more or less parallel, forming thick matted layers. *Scape* 400–600 mm long, simple or sometimes with 1–2 branches, with a dense tuft of dried leaves at the base. *Leaves* 5–6 or more, wiry, filiform terete or subterete, acuminate, striate when dry, 600–700 × 1–3 mm, often

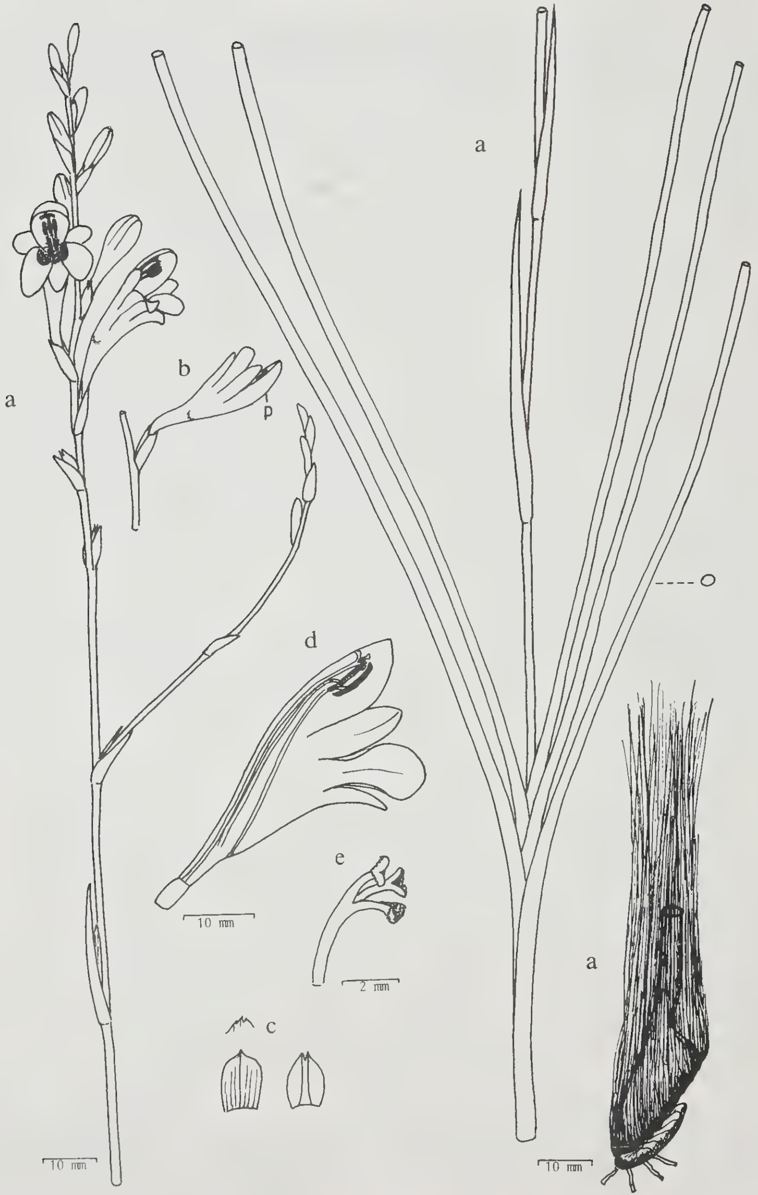

FIG. 14.
Tritonia kamisbergensis (*De Vos 2448*): a, plant; b, an inverted flower; c, outer (left) and inner (right) bract; d, flower half in a median section; e, style branches and stigmas.

longer than the scape; cauline leaves 1–3, 30–180 mm long, very narrow. *Spike* distichous, rather lax, with 4–12 flowers, sometimes with 1–2 branches. *Bracts* herbaceous in the lower half, becoming membranous in the upper, with brown tips, 5–8 mm long; outer acute, acuminate, or lacerated or sometimes minutely 3-toothed; inner bidentate, as long as the outer or slightly longer, 2-veined. *Flowers* zygomorphic, (26–)30–35 mm long, often inverted, almost ruby-red (RHS 60A–C), drying to purple. *Perianth tube* 16–20 mm long, funnel-shaped, curved, sometimes twisted, widened gradually from the base to ca. 8 mm diam. at the slightly oblique mouth, with two slight protuberances at the insertion of the stamens; *segments* unequal, 8–12 mm long, obtuse, with the inner wider than the outer and the posticous segment largest, subrotund, 10–12 mm wide, concave, hooded, others oblong or shortly obovate, 6–9 mm wide, the three anticous lobes with a wide, white, median line running down to the tube. *Stamens* curved towards the posticous segment; *filaments* 12–15 mm long, pale; *anthers* 4–6 mm, contiguous, bright violet, later paler; pollen pale. *Ovary* ca. 2 mm long; *style* (18–)20–25 mm long, curved, pale; *stigmatic branches* 1,5–2 mm long, widened and minutely crisped at the tip, reaching the anther tips. *Capsules* subglobose, ca. 4 mm long.

Flowering period: November to early December.

Distribution: In rocky fissures on the Kamiesberge, Namaqualand.

CAPE—3018 (Kamiesberg): 73.12 (= Namaqualand, Reise nach Kamiesberg, Boschmanland bis zur Mündung des Garieps), *Ecklon & Zeyher s.n.* (L), *Irid. 109* (MO, S), *Zeyher s.n.* (G); Kamiesbergen, *Ecklon & Zeyher 109* (SAM, B), *Taylor 5543* (STE); Upper slopes of Rietkloof mts., *Pearson 5706* (BOL, SAM, K); On a rocky ridge ca. 33 km from Garies towards Platbakkies (-AC), *Malan s.n.* sub De Vos *2448* (STE).

Without locality: sub *Freesea kamisbergensis* Eckl. (S).

On account of herbarium specimens with badly preserved flowers and the absence of a corm, this species was incompletely known until recently when it was collected by M. E. Malan on a rocky ridge of the southern Kamiesberg.

It is distinguished by its corm which is deeply embedded in rocky fissures, its long, wiry, filiform leaves some of which often overtop the spike, bracts which remain herbaceous in their lower half, and by *Gladiolus*-like flowers, almost ruby-red in colour, with a long, curved, funnel-shaped perianth tube. Baker erroneously described the perianth segments as twice as long as the tube (1892, 1896).

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